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SOIL SURVEY OF HURON COUNTY

BY

D. W. HOFFMAN

EXPERIMENTAL FARMS SERVICE

AND

N. R. RICHARDS and F. F. MORWICK

ONTARIO AGRICULTURAL COLLEGE

GUELPH, ONTARIO

FEBRUARY 1952

Reprinted January 1990

REPORT No. 13 OF THE ONTARIO SOIL SURVEY

Ontario

Ministry of Agriculture and Food

David Ramsay, Minister

Agriculture Canada

Research Branch

Direction générale de la recherche

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PREFACE

The soils of Huron County were surveyed during the summers of 1946 and 1947.

Other counties and districts surveyed and maps published are as follows:

1. *Norfolk*.....*Map only*
2. *Elgin*.....*Map only*
3. *Kent*.....*Map only*
4. *Haldimand*.....*Map only*
5. *Welland*.....*Map only*
6. *Middlesex*.....*Map only*
7. *Carleton*.....*Map and Report*
8. *Parts of Northwestern Ontario*.....*Map and Report*
9. *Durham*.....*Map and Report*
10. *Prince Edward*.....*Map and Report*
11. *Essex*.....*Map and Report*
12. *Grenville*.....*Map and Report*

ACKNOWLEDGMENTS

The Canada Department of Mines and Resources, Surveys and Engineering Branch, Hydrographic and Map Service, supplied the base maps. The final copy of the Soil Map for lithographing was prepared by the Cartographic Section of the Division of Field Husbandry, Soils and Agricultural Engineering, Central Experimental Farm, Ottawa.

Helpful suggestions pertaining to classification and correlation, and assistance in critically reviewing the manuscript came from Dr. P. O. Ripley, Dr. A. Leahey, Dr. P. C. Stobbe, Canada Department of Agriculture; and Dr. F. A. Stinson, formerly with the Soils Department, Ontario Agricultural College.

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FIG. 1—Outline map of Ontario showing location of Huron County and other areas for which soil maps have been published.

Soil Survey of Huron County, Ontario

by

D. W. Hoffman, N. R. Richards[1] and F. F. Morwick*

INTRODUCTION

The Soil Survey of Huron County, initiated in 1936 by the Experimental Farms Service, Canada Department of Agriculture, in co-operation with the Soils Department of the Ontario Agricultural College, was completed in 1947. The survey involves the preparation of a soil map and the writing of a Soil Survey Report. The map is drawn on two sheets to the scale of one inch to the mile. The soils have been delineated according to differences in topography, drainage, texture, stoniness, etc. The Report describes the different soils and discusses land use and soil management problems commonly found in Huron County. The soils of the County are rated according to their adaptability to grow crops. The fundamental purpose of the Soil Survey is to provide basic information as to the *quality* and *quantity* of the soil resources in the surveyed area.

[1] Head, Soils Department, Ontario Agricultural College, formerly Senior Pedologist, Experimental Farms Service.

* Mr. J. D. Seymour and Mr. H. M. McElroy assisted with the field work; the analytical work was done by Dr. A. L. Willis and Messrs. H. S. Ive, E. F. Bolton and D. W. Hoffman. Miss G. V. Palmer assisted with the drawing of maps, charts, etc.

PART I

GENERAL DESCRIPTION OF AREA

Location and Area

Huron County is located in the western portion of southern Ontario. It is bordered by Lake Huron on the west, Perth and Wellington Counties on the east, Bruce County on the north and Lambton and Middlesex Counties on the south. Goderich is the principal town and is situated on Lake Huron 110 miles west of Toronto and 55 miles northwest of London.

The County has an area of approximately 1295 square miles or 828,800 acres (Eighth Census of Canada, 1941). Of this, approximately 798,169 acres is occupied farm land.

County Seat and Principal Towns

The town of Goderich is the county seat with a population of 4,557 persons. It is a lake-front town with excellent harbor facilities and is well known for its grain elevators, flour mills, and salt wells. Many other industries are located in the town and all contribute to the well being of the area in general. Goderich is a popular summer resort centre. The town is planned in the form of a wheel, the streets radiating from the square or hub like spokes.

Wingham (2,030)* is situated in Turnberry township, in the valley of the Maitland River. The town is industrially active being the home of a furniture factory, sash and door factory, a foundry, and two creameries. The local radio station provides a worthwhile service to the town and surrounding country and is an asset of considerable importance.

The Agricultural Representative's Office is situated in Clinton (1,896)* which is located in the central portion of the County. Creameries in Clinton provide a ready market for eggs, cream and other farm products.

The town of Seaforth (1,668)* is approximately eleven miles east of Clinton and also supplies a market for agricultural products. A flax mill and creameries are located there as well as a few other industries.

* Population figures in brackets according to 1941 Census.

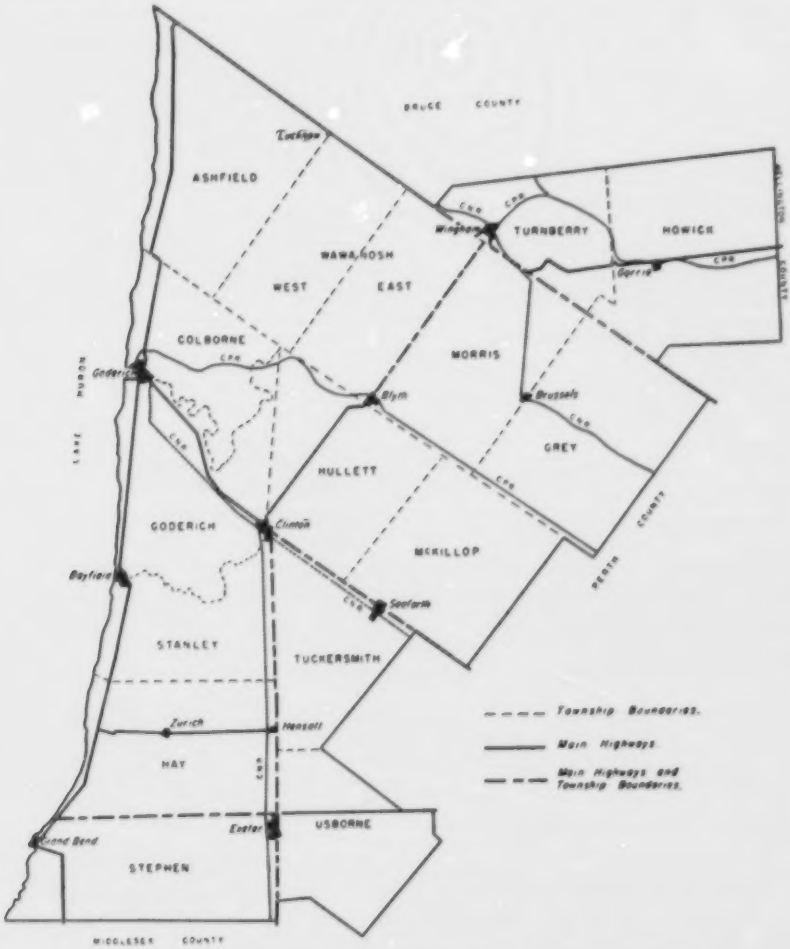


FIG. 2—Outline Map of Huron County Showing Townships, Towns, Railways, etc.

Exeter (1,589) is situated in the southern part of the County. A large cannery is located in the town where the canning crops produced in the area are marketed and processed.

Other villages, namely, Blyth (611), Brussels (825), and Hensall (665) provide local markets for farm products. The long lakeshore is an excellent vacation land and many visitors are attracted during the summer months.

Population and Racial Origin

The total population of Huron County as recorded by the 1941 Census is 43,742 persons, 23,419 of these being on farms. The population of urban areas totals 14,162, leaving 6,161 persons as the rural non-farm population. The shift in population would appear to be away from the County altogether. From 1881 to 1941 there has been a loss in the total population of the County of 32,784 persons (1941 Census). It is suggested that this loss is due to a movement of people from rural districts to cities in other areas since the population of the urban areas in Huron County has remained about the same throughout the period of sixty years. The loss of population is graphically shown in Figure 3.

Although the dominant racial origin is British, many others are present. The following figures from the 1941 Census indicate the proportion according to racial origin:

Total Population	43,742	100%
Canadians of British Origin	36,782	84.2%
Canadians of German Origin	5,108	11.9%
Canadians of French Origin	1,183	2.7%
Other Origins	669	1.2%

Transportation and Markets

Transportation is quite diversified in Huron County. Good roads and railways act as connecting lines between the more densely populated urban areas and farming districts.

The towns of Clinton, Goderich, Seaforth and Wingham serve as local markets for farm produce.

The County is well traversed with good gravel roads and paved highways which connect the main centres. Highway No. 4 runs in a north and south direction and joins the centres of Exeter, Clinton, Blyth and Wingham. Running approximately east and west is Highway No. 8 which acts as a connecting link between Goderich, Clinton and Seaforth and which also is a transportation route to the cities of Stratford and Kitchener. Also running approximately east and west are Highways 83, 84, 86 and 87, which also furnish important transportation routes. Along the lakeshore is Highway No. 21, the famous Bluewater Highway, which serves as a favoured route to the many summer resorts along the shores of Lake Huron and Ontario's northland.

In addition to the main highways mentioned above there is an excellent network of county highways and township roads that serve the whole County.

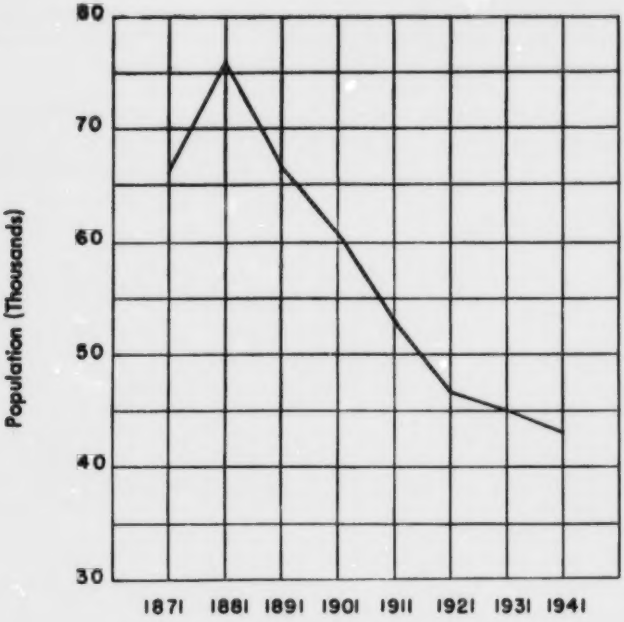


FIG. 3—Trends in population for Huron County (1871-1941).

The Canadian National and the Canadian Pacific Railway lines provide transportation facilities to the County. Goderich, Clinton and Seaforth are served by both railways. The Canadian National Railway connects these towns with the divisional point at Stratford where connections for London and Toronto may be made. The Canadian National also runs between Clinton and London providing connections to the main Toronto-Chicago line. Another Canadian National line joins Kincardine and Palmerston allowing connections to be made with the Owen Sound and Toronto line. The railway systems afford connections to all of the major centres and supply good transportation to the main marketing centres of Stratford, London and Toronto.

PART II

FACTORS AFFECTING THE FORMATION OF HURON COUNTY SOILS

The soil is a natural body found at the surface of the earth. It occupies a layer varying in depth from a few inches to several feet and consists of a mixture of minerals, water, air and organic matter which occur in varying proportions. Soils are formed through the action of climate and organisms on disintegrated rock particles. Within a climatic zone, differences in soil development occur due to local environmental factors such as soil parent material, drainage and differences in vegetation. The length of time a soil has been in the process of development will also account for differences.

Soil Materials

Soil development begins with the formation of the parent material which is derived from the disintegration and weathering of rocks. Parent material may be shallow or deep; may consist of coarse rock fragments, single grain particles high in silica as in coarse sands, very fine clays or silts, or a combination of two or more of these. The parent material may be relatively uniform in chemical composition or quite variable. Some materials are weathered more easily to form soils than are others. It would appear that the soil materials of Huron County have been transported relatively short distances since many of the rock fragments exhibit characteristics similar to the underlying bedrock.

Huron County is almost wholly underlain by the Norfolk formation which consists of grey, brownish-grey and brown, crystalline to fine grained limestone, magnesian limestone and dolomite in fairly even beds varying in thickness. An analysis of the Norfolk formation found in Huron County is presented here and compared with an analysis of the Guelph formation occurring in Wellington County.

TABLE 1

AN ANALYSIS* OF A ROCK SAMPLE FROM THE GUELPH AND NORFOLK FORMATIONS

	Norfolk Formation Huron County†	Guelph Formation Wellington County‡
Silica (SiO_2)	1.34	0.32
Ferric Oxide (Fe_2O_3)	0.32	0.19
Alumina (Al_2O_3)	0.38	0.29
Tri-Calcium Phosphate ($Ca_3(PO_4)_2$)	0.07	Tr
Calcium Carbonate ($CaCO_3$)	94.95	55.47
Magnesium Carbonate ($MgCO_3$)	2.89	43.42
Total	99.95	99.79

* Limestones of Canada, Part IV; Goudge, M. F., Canada Dept. of Mines.

† Sample for analysis from Maitland River valley.

‡ Quarry of Gypsum, Lime and Alabastine, Canada Ltd., Elora.

The bedrock is covered with unconsolidated materials or drift, most of which was laid down by the ice during the last or Wisconsin glaciation. Small areas of flood land along present stream courses, small areas resulting from wind and water deposition and larger areas of peat and muck are of more recent origin.

The soil materials of Huron County are separated into the following groups:

1. Coarse open till
2. Loamy limestone till
3. Subaqueous till
4. Lacustrine
5. Glacio-fluvial
6. Outwash
7. Organic

1. Coarse Open Till

The coarse open till materials occupy a small area in Huron County. They are located around the town of Wingham and some of the roughest topography found in the County is associated with these materials. The topography ranges from irregular gently sloping to irregular very steeply sloping.

The till is calcareous and extremely coarse, being composed of a mixture of large boulders, stones and sand. The boulders and stones are either limestone or granite. The materials, although slightly compacted, are very porous and allow for ready movement of soil moisture.

2. Loamy Limestone Till

The loamy limestone till is found in areas where the melting ice has left deposits of considerable depth which have not been subsequently modified, to any appreciable extent, by water. There is a lack of sorting, with stones, ranging in size from grit to boulders, being scattered irregularly throughout a matrix of sand, silt and clay, in varying proportions. The topography is smooth gently sloping to smooth moderately sloping, and there are fewer boulders than are found in the coarse open till materials. In general the loamy limestone materials are found in the area north of Clinton and east of Dungannon and they make up nearly three-quarters of this area. The till contains a large proportion of rock fragments derived from the Norfolk formation which is reflected in its calcareous nature.

3. Subaqueous Till

The subaqueous till covers approximately half of the County and predominates in the southern and western sections. The topography varies from smooth gently sloping to smooth moderately sloping and may be somewhat depressional in some areas.

The till is of limestone origin and has been modified by the presence of lacustrine waters. The till is somewhat variable in composition and in some locations varves were noted, indicating the presence of lacustrine materials. The texture is usually clay or clay loam. The stone content varies considerably but in most instances there are fewer stones present than in the previously mentioned till materials.

4. Lacustrine

The lacustrine materials were deposited in deep bodies of water and are typically stone-free. The largest lacustrine deposit in Huron County occurs south of Grand Bend and in this location many small shells are present in the soil materials. In many lacustrine deposits alternate layers of dark coloured clay and light coloured silt are common. These layers, which are known as "varves", are usually destroyed by the weathering processes and are not discernible in the solum but are found intact in the unweathered parent material.

In general, the lacustrine soils range from silt to clay in texture, are stone-free, and, in Huron County, are usually poorly drained.

5. Glacio-Fluvial

These are deposits of poorly sorted gravel, sand and till. This group occupies some large areas in the Townships of Turnberry, East and West Wawanosh and Grey.

The texture of the glacio-fluvial materials is variable, ranging from coarse sand to loam. The petrographic composition of the gravel and sand is similar to that of the till found in the area.

The topography is irregularly steeply sloping and there are glacial pot holes, which have no drainage other than down through the soil materials. The materials are porous, relatively deep, and lack uniformity in size of particles and sorting throughout their depth.

6. Outwash

The outwash materials consist of well sorted sands and gravels and are found as deltaic and outwash deposits. These materials are most commonly found in the western and northern sections of the County and usually occur close to present or former drainage channels. The materials were deposited in moving water and the size of the particles varies according to the depth and velocity of the water which laid them down. Occasionally a fine textured overburden, which was possibly deposited at a time when the water was still or nearly so, covers the gravel. The topography is typically nearly level but subsequent water erosion has dissected the areas near the lakeshore leaving numerous gullies and channels. The shore-lines of glacial lakes are prominently defined in some areas by sand and gravel beaches.

The texture of the parent material is rather variable, grading in size from gravel to coarse and fine sands. The outwash materials usually exceed three feet in depth. There are areas, however, where till and clay occur at depths of three feet and less and the outwash veneer is thin.

7. Organic

The humified remains of trees, herbs and mosses make up surface deposits referred to as organic materials. These materials differ according to the source of plant material from which they formed and according to the stage of decomposition. Areas where organic materials are fibrous and woody are called peat. Muck occurs where the organic materials are in an advanced state of decomposition. No peat deposits occur in Huron County.

The distribution of the soil materials of Huron County is shown in Fig. 4.

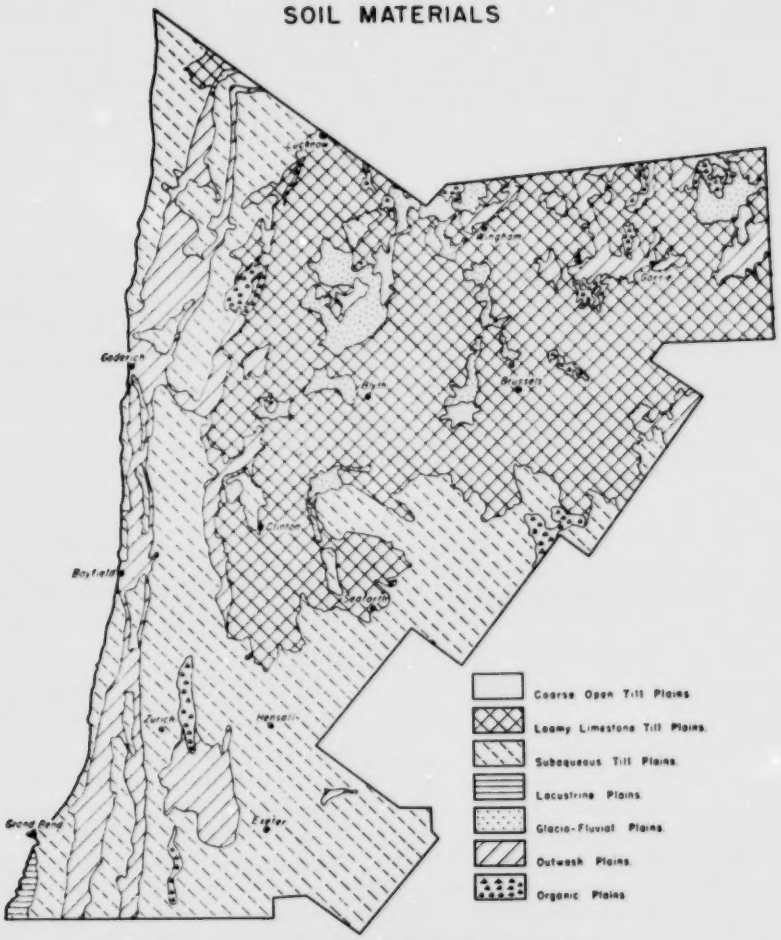


FIG. 4—Outline map of Huron County showing distribution of soil materials.

Relief

The elevation of the land in Huron County, as given on the topographical sheets published by the Department of National Defence, ranges from approximately 600 to 1,275 feet above sea level. The highest sections are in the eastern part of the County and there is a fall in elevation from east to west. In general there is sufficient slope to facilitate fair regional drainage.

South of Bayfield the slopes occur on a north-south axis and there is a close relationship between present relief and former beach lines of the Great Lakes system. The northern section of the County is dominantly rolling to hilly with more level areas occurring in McKillop Township and along the lakeshore in Ashfield, Colborne and Goderich Townships. The foregoing describes the overall relief of the area. There is, however, a wide range and the relief may vary considerably even within small local areas. The topographic classes of Huron County are indicated in Figure 5.

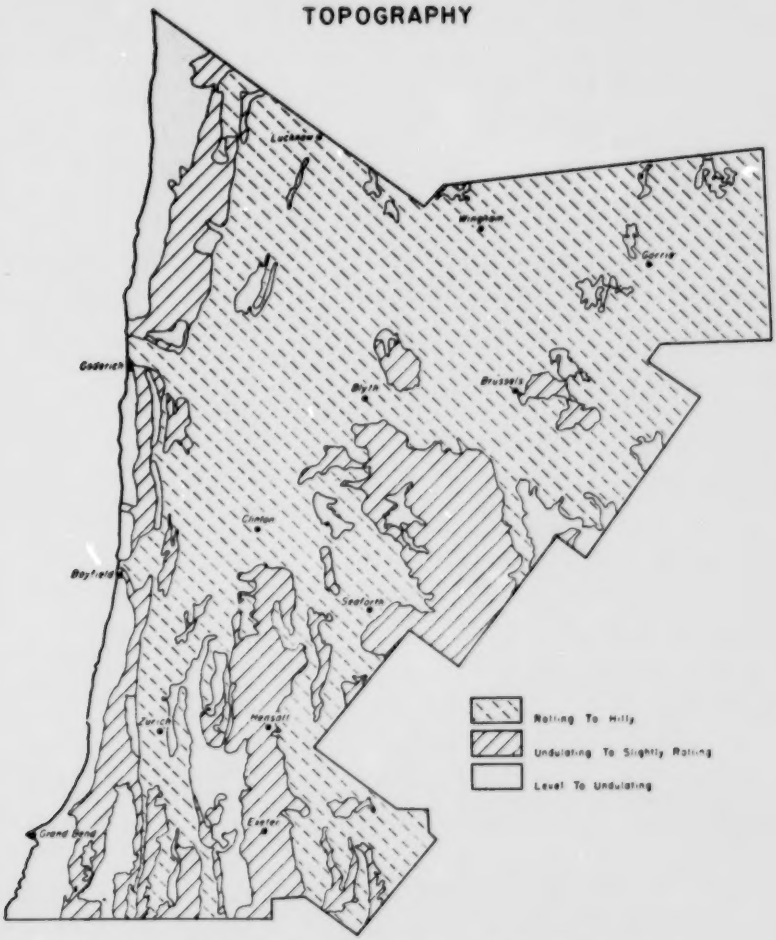


FIG. 5—Outline map of Huron County showing distribution of topographic classes.

Drainage

The rivers in the County generally flow from east to west and empty into Lake Huron. The Lucknow and Maitland River systems drain the upper half of the county, the lower section being drained by the Bayfield and Ausable River systems. Many small creeks and rivers are found along the lakeshore which provide good drainage and also present a serious problem in gully erosion. The drainage pattern of the County is shown in Figure 6.

Climate

Both rainfall and temperature play a significant part in the process of soil development and in determining certain features of the soil. They also determine to a large extent the crops which can be grown in an area.

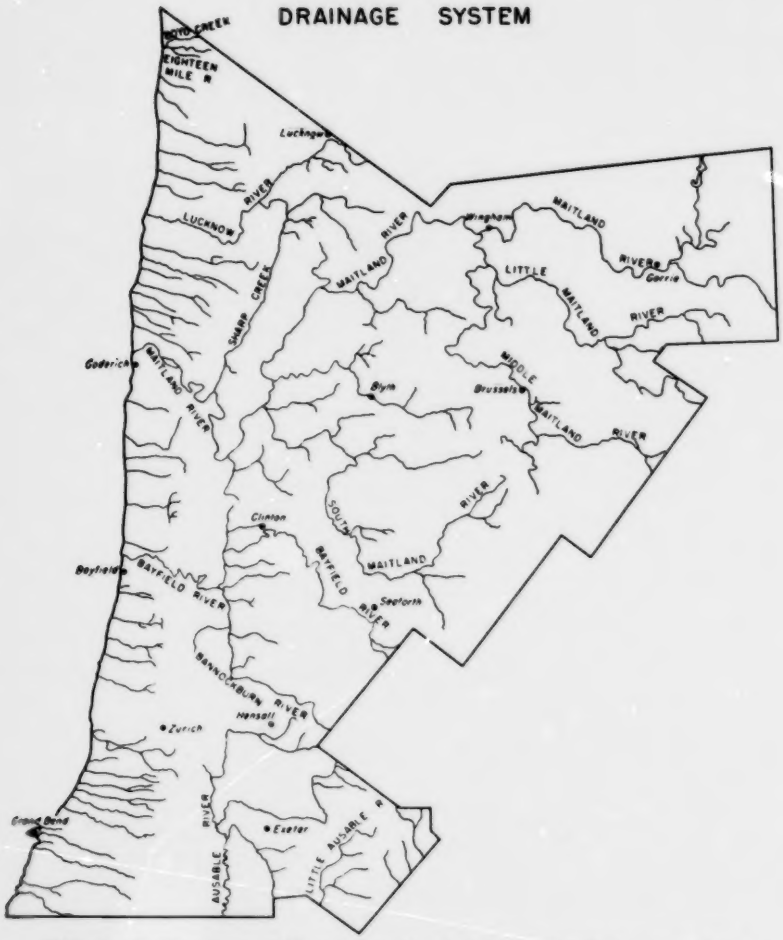


FIG. 6—Outline map of Huron County showing main drainage system.

The rate at which the water moves through the soil materials is reflected in the soil profile. The number, distinctiveness, and colour of the horizons and the depth of the solum, reflect the effect of moisture.

*Putnam and Chapman have included Huron County in two climatic regions, the Lake Huron-Georgian Bay region and the Western Uplands region. The Lake Huron-Georgian Bay region includes a narrow zone along the shore of Lake Huron, most of the area lying below an elevation of 800 feet. The remainder of the County lies in the zone known as the Western Uplands.

Meteorological stations for the County are situated at Lucknow and Brucefield, representing the Western Uplands region, and Goderich representing the Lake Huron-Georgian Bay region. Data are presented from these zones and others for purposes of comparison.

* Putnam, D. F., and Chapman, L. J. — "The Climate of Southern Ontario," Sci. Agriculture, 18:8 — April, 1938.

TABLE 2

MEAN MONTHLY TEMPERATURE FOR GODERICH, BRUCEFIELD, LUCKNOW, AND OTHER SELECTED POINTS IN ONTARIO.

	Period of Records	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Mean Annual
Brucefield	34	21	18	28	40	52	62	68	65	60	48	36	25	44
Goderich	31	23	23	28	41	54	63	68	67	61	50	37	28	45
Lucknow	47	20	18	27	41	53	62	67	65	59	47	35	25	43
Kapuskasing	19	−2	2	14	31	46	57	62	60	51	39	22	6	32
Huntsville	30	14	12	24	39	52	61	66	64	57	45	32	19	41
Brantford	51	22	20	31	43	55	65	70	67	61	48	37	26	45

Temperature in degrees Fahrenheit

TABLE 3

AVERAGE MONTHLY RAINFALL IN INCHES FOR GODERICH, BRUCEFIELD, LUCKNOW AND OTHER SELECTED POINTS IN ONTARIO

	Period of Records	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Mean Annual
Brucefield	34	2.76	2.06	2.31	2.82	2.88	2.82	3.25	2.57	3.11	3.39	3.51	2.91	34.39
Goderich	45	2.94	2.46	2.24	1.80	2.52	2.16	2.00	2.17	2.47	2.45	2.56	2.59	28.36
Lucknow	47	3.65	2.68	2.41	2.57	3.04	2.69	2.99	2.61	3.26	3.71	3.91	3.82	37.34
Kapuskasing	19	2.00	1.06	1.56	1.82	2.12	2.33	3.43	2.94	3.54	2.50	2.39	1.90	27.59
Huntsville	30	3.09	2.45	2.78	2.09	2.85	3.69	2.96	2.70	3.84	3.44	3.24	3.28	36.41
Brantford	51	2.61	2.12	2.16	2.54	2.90	2.65	3.05	2.93	2.63	2.47	2.40	2.24	30.70

The data from Brantford represent the southern hardwood zone, Huntsville the transitional zone between hardwoods and conifers, and Kapuskasing the northern coniferous region. The difference in vegetation is due, in part, to the difference in climate, the higher temperatures prevailing in the Brantford region.

Comparison of the data for the stations situated in Huron County shows the mean annual temperature for the Lake Huron shore to be 45 degrees F., while that of the part of the County located in the Western Uplands region ranges from 43 to 44 degrees. Mean monthly temperatures rarely go below 23 degrees F. for the part of the County located in the Lake Huron area, because of the moderating influence of the lake, but the mean monthly temperatures for the Western Uplands region go as low as 18 degrees F. The frost-free period for the Lake Huron shore is approximately 147 days and the growing season varies from 196 to 200 days. The part of the County included in the Western Uplands region has a frost-free period of 125 to 140 days and a growing season of 189 to 196 days.

In general the temperatures of Huron County are quite similar to those of the rest of agricultural Southern Ontario. The winter is not too cold to prevent the growth of winter wheat and the growing season is long enough to permit the growth of most farm crops.

Data presented in Table 3 shows a difference in mean annual rainfall between the "Lake Huron-Georgian Bay" region and the "Western Uplands" region. The mean annual rainfall for the Lake Huron area is approximately 28 inches, while that for the part of the County located in the Western Uplands region varies from 34 to 37 inches. The higher precipitation in the Western Uplands region is partially due to greater snowfall than the Lake Huron-Georgian Bay region.

Spring cultivation may be retarded in regions where the snowfall is heavy or where frequent spring rains cause excess moisture in the soil. Excess moisture is often due to slow percolation, which is common on level, clay soils. In instances where runoff is rapid, owing to large amounts of melting snow or heavy downpours of rain on sloping land, severe erosion may occur.

From the above data it would seem that the amount and distribution of rainfall is satisfactory for general farm crops. There is little likelihood of drought and the weather is usually favourable during the harvesting season.

TABLE 4

CLIMATIC DIFFERENCES IN HURON COUNTY

	Lake Huron-Georgian Bay	Western Uplands
Mean Annual Precipitation	28– 30 inches	34– 37 inches
Mean Annual Temperature	45 degrees F	43–44 degrees F
Length of Growing Season	196–200 days	189–196 days
Frost-free period	147 days	125–140 days
Snowfall	60– 80 inches	80–120 inches

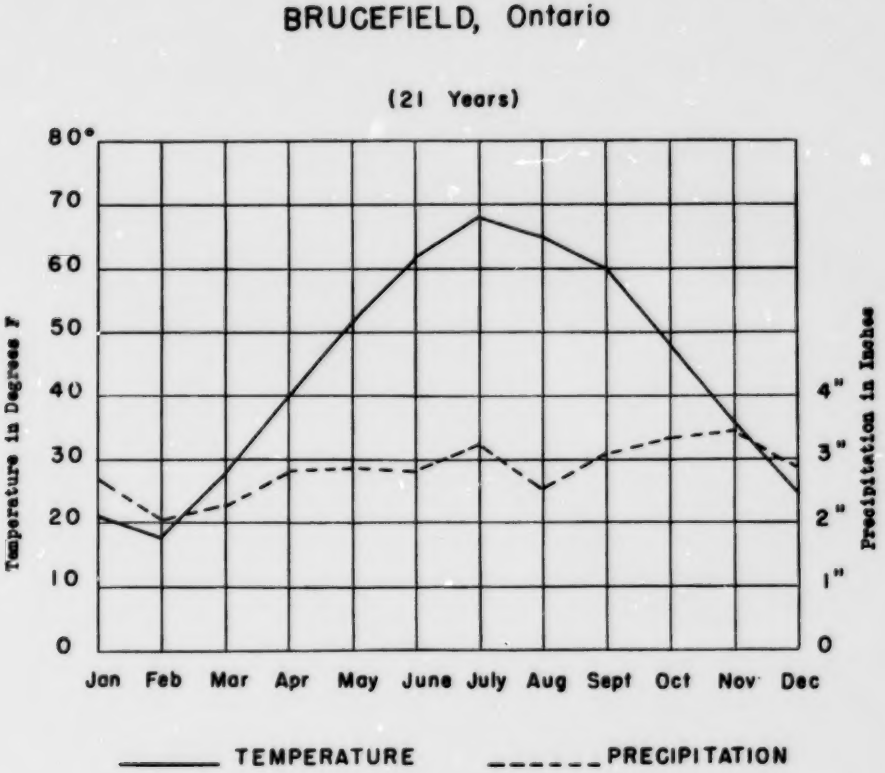


FIG. 7—Mean Monthly Temperature and Precipitation

Natural Vegetation

Once vegetative cover becomes established on soil materials it influences the type of soil formation that occurs. The chemical composition and the organic matter content of the soil are also affected by vegetation. Different vegetative cover occurring on different soils may be due to differences in such factors as texture, drainage, reaction.

In addition to the trees named below, species such as black walnut, silver birch, sycamore, bitternut hickory, ironwood and aspen also occur. *Halliday includes the County in the Huron-Ontario section of the Great Lakes-St. Lawrence Forest Region. The distribution of the associations throughout Huron County is shown in Figure 10.

The Soil Survey of Huron County revealed that there are certain associations of trees that occur more frequently on some soils than others. No attempt was made to make a detailed vegetative cover map of the area but the general broad relationships that were noted are presented herewith.

* Halliday, W. E. D. — A Forest Classification for Canada, Bull. 89. Forest Service, Dept. of Mines and Resources, Ottawa.

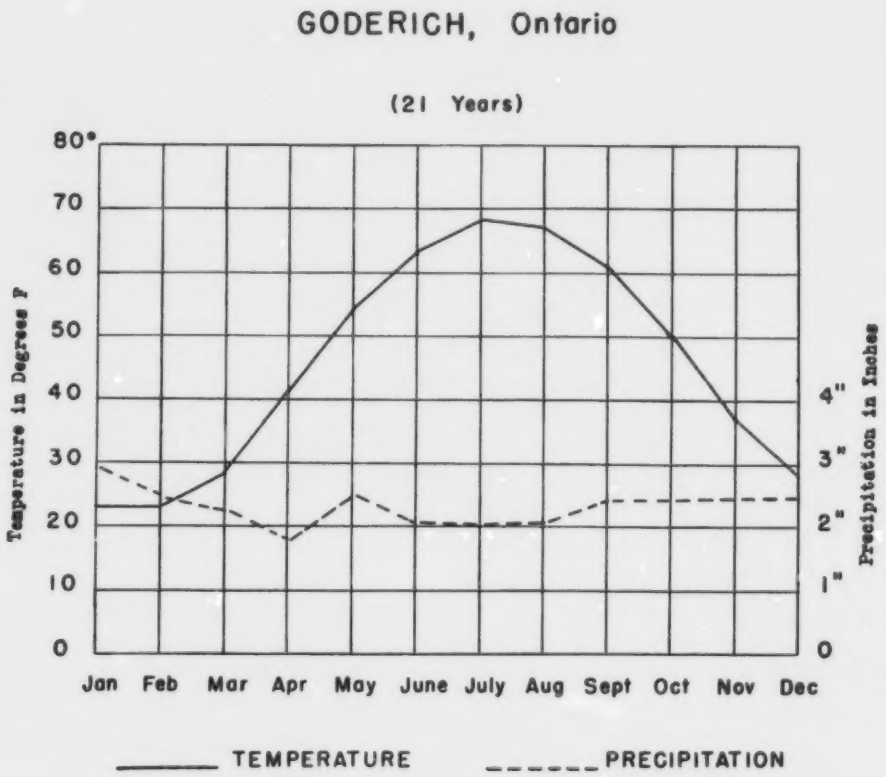


FIG. 8—Mean Monthly Temperature and Precipitation.

The natural vegetation of Huron County is mainly deciduous, the commonly occurring associations being:

1. Sugar Maple, Beech Association

This association is common to the well drained soils, except those of heavy texture. Other species included in the association are basswood, white ash, and some oak. Pine occasionally occurs on the light textured outwash soils.

2. Soft Maple, Elm Association

Soft maple and elm dominate the imperfectly drained soils and the well drained heavy textured soils. Aspen, ash and hemlock are also common. This association most commonly occurs in the south-eastern part of the County.

3. Elm, Ash, Cedar Association

The poorly drained soils of Huron County support a vegetative cover that is made up chiefly of elm, ash and cedar. Spruce, silver maple and aspen are also common to this association.

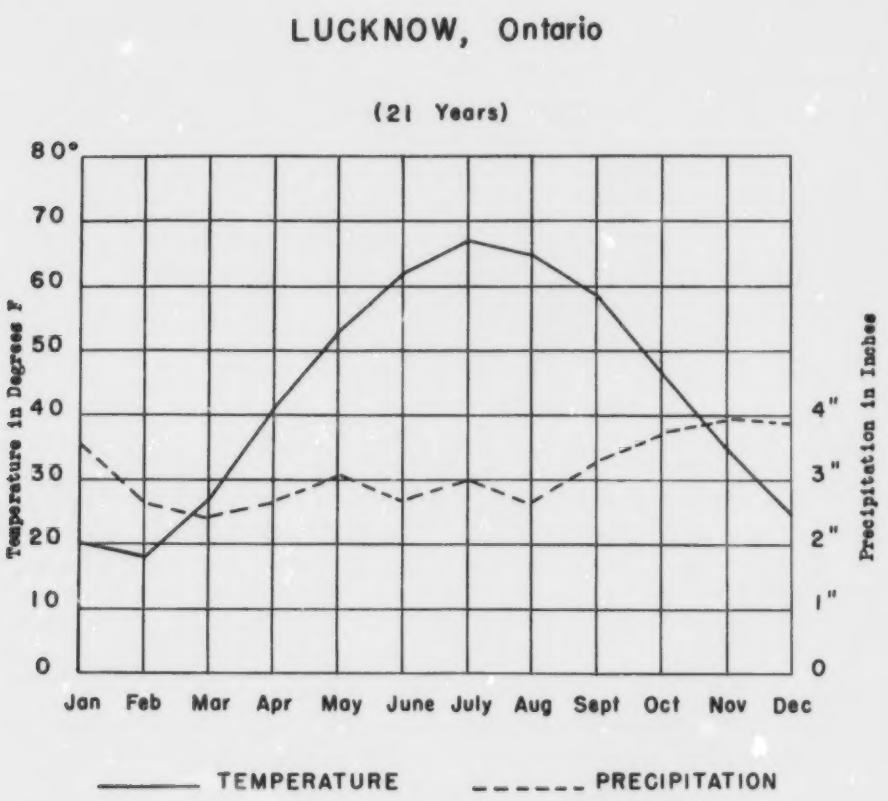


FIG. 9—Mean Monthly Temperature and Precipitation.

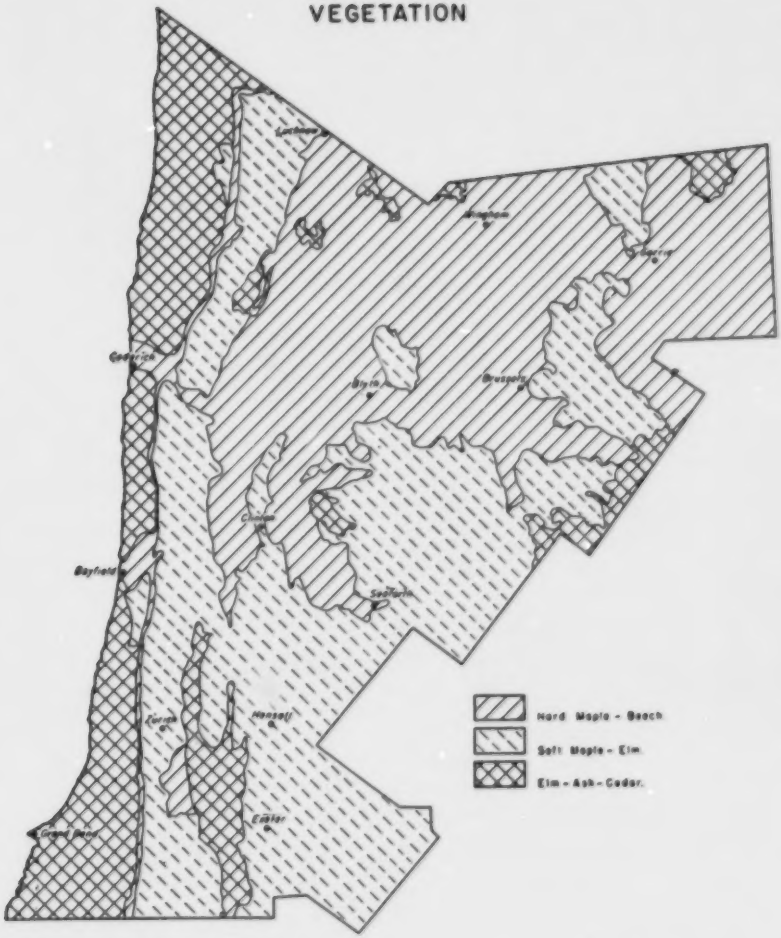


FIG. 10—Outline map of Huron County showing distribution of tree associations.

Age

According to Antevs,† glacial lakes Warren and Whittlesey receded about 23,000 years ago. Therefore, the soils of Huron County have been weathering for approximately that length of time. Soils west of the various beach lines are probably somewhat younger but the difference in age is not manifested in the profile characteristics of the soil. Fairly large proportions of imperfectly and poorly drained soils occur to the west of the old beach lines and the horizon differentiation in the profiles is poorly defined. The profiles, on the well drained sites in Huron County, exhibit well developed Grey-Brown Podsolic characteristics.

† Antevs, E.—Late Quaternary Upwarpings of Northeastern North America; Jour. of Geol., Vol. 47, 1939.

PART III

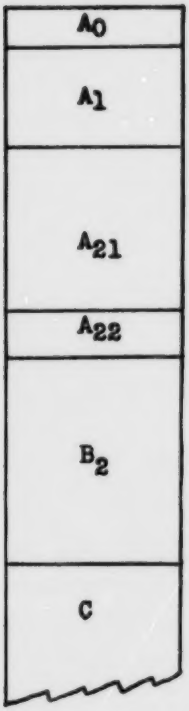
THE CLASSIFICATION AND DESCRIPTION OF HURON COUNTY SOILS

Soils are the products of the environmental conditions under which they are developing. These conditions are governed by the effect of climate and vegetation over a period of time on parent materials under existing drainage conditions. The different layers which have developed in the soil during its process of formation can be observed in a vertical cross-section of the soil to a depth of about three feet. This cross-section, including part of the underlying parent material, is generally referred to as the soil profile, and the individual layers are called the horizons of the profile. In Huron County the kind and number of horizons found in the soil profile and the sequence in which they occur vary greatly among the different soils.

In the area under discussion three distinct kinds of profile occur. Each kind of profile represents what is called a Great Soil Group which has a wide distribution in Eastern Canada and to a lesser extent in North America.

The Grey-Brown Podzolic soils have developed under well drained conditions from calcareous parent materials. In the development of Grey-Brown Podzolic soils the podzolization process has been dominant. This process has led to the depletion of bases, development of acidity, and the formation of eluvial A horizons and illuvial B horizons. Tree leaves and other organic debris collecting on the surface of the soil decompose to give rise to acidic products. As the acids generated in the organic material are moved downward by percolating water, they attack the soil minerals removing soil cations. The acid weathering of the soil minerals causes a marked loss of the metallic cations, including iron and aluminum, but most of those of silica remain behind. Organic and inorganic colloids are dispersed and moved downward in the percolating waters. With the removal of iron compounds and other colouring materials a light grey or pale brown colour develops where leaching is most intense. This layer constitutes the A_2 horizon of the Grey-Brown Podzolic soil.

Immediately below the A_2 horizon, iron and aluminum accumulate along with colloidal clay and colloidal organic matter. The layer formed is called the B horizon and is usually brown or dark brown in colour with a somewhat heavier texture than the A_2 horizon. The easily soluble carbonates of calcium, magnesium, etc., are removed from the A horizon and carried away in the drainage waters. The following is a generalized profile description of a Grey-Brown Podzolic soil.



A_0 — Accumulated layer of partially decomposed litter from deciduous trees.

A_1 — Dark greyish brown to a very dark brown mineralized humus layer.

A_{21} — Dark yellow-brown layer.

A_{22} — Pale brown layer.

B_2 — Dark brown layer.

C — Light greyish-brown calcareous parent material.

In the Grey-Brown Podzolic soils in Ontario a secondary Brown-Podzolic or Podzol profile usually occurs in the A_2 horizon of the Grey-Brown Podzolic profile. On the medium and heavy textured soils the secondary or superimposed profile exhibits the characteristics of the Brown Podzolic soils. The dark surface layer is underlain by a brown or yellowish brown friable subsoil which gradually fades in colour and overlies the B horizon of the Grey-Brown Podzolic profile. On the sands and sandy loams the superimposed profile is usually a Podzol. In the Podzol profile the dark surface layer is underlain by a grey leached layer which in turn is underlain by a brown or yellowish brown layer which fades in colour and rests on the B horizon of the Grey-Brown Podzolic profile. Usually it is only under virgin conditions that the secondary Podzol profile can be noted, since the grey leached layer becomes incorporated with the dark surface layer upon cultivation.

The Harriston loam exhibits the characteristics of the Grey-Brown Podzolic soils.

A large proportion of the soils in the surveyed area have developed under poorly drained conditions. The poorly drained soils of Huron County are representative of the following Great Soil Groups: Dark Grey Gleisolic soils, Bog soils and Alluvial (young) soils.

The Dark Grey Gleisolic soils have a dark, friable, granular surface layer, generally 4 to 6 inches thick, which is underlain by a mottled brownish grey subsoil that gradually grades into the parent material. In comparison to the well drained soils that have uniformly brownish or yellowish brown subsoils the poorly drained soils have rusty specks and streaks and bluish grey colours in the subsoil. The discoloration or mottling of the subsoil is one of the distinguishing features of poorly drained soils. The Dark Grey Gleisolic soils generally do not have a marked leached layer or layer of accumulation. The following is a generalized description of a Dark Grey Gleisolic soil.

Beech and maple predominate in the natural vegetative cover of the Grey-Brown Podsolic soils.

A_0 — Accumulated layer of partially decomposed litter from deciduous trees.

A_1 — Dark grey to very dark grey mineralized layer.

G — Brownish grey mottled mineralized layer.

C — Greyish brown calcareous parent material.

Brookston clay loam belongs to the Dark Grey Gleisolic Great Soil Group. Note the dark surface horizon underlain by a mottled glei layer.

The Bog soils consist of organic accumulation one to three feet and more in depth. They may differ according to the degree of decomposition of the organic materials from which the soils have developed. The well decomposed dark Bog soils are referred to as "Muck" and the poorly decomposed organic materials as "Peat". The Bog soils have formed under very poorly drained conditions and frequently occupy depressional areas which receive considerable seepage.

The Alluvial soils consist of recently deposited material which has not been in place long enough for definite soil horizons to develop. However, layers differing in texture as a result of periodic flooding, can frequently be observed in the profile of these young alluvial soils.

System of Classification

On the basis of their differentiating characteristics, soils are grouped into categories which can be described and readily recognized. Those categories commonly used in mapping soils are the series, type, and phase.

The soil series is a group of soils having genetic horizons similar as to differentiating characteristics and arrangement in the soil profile and developed from a particular type of parent material. With the exception of texture, particularly in the A_1 horizon, the physical character and thickness of the various horizons do not vary significantly within a series. Such characteristics include colour, structure, organic matter content, reaction and texture with the exception of the A_1 horizon.

The soil type is the principal unit of mapping and is the most specific in character of any of the units. A soil series may consist of one or more types differentiated on the basis of texture. Hence, a soil type name consists of a series name plus the textural class name determined principally from the texture of the A horizon. Although the soil type is the lowest category of separation and the most specific unit recognized in mapping soils, it should be pointed out that it includes a range of conditions. The profile descriptions presented in the report do not represent a specific location but cover the conditions that occur most commonly within a delineated unit. With mapping done on the relatively small scale of one inch to the mile, it follows that through necessity a reasonable amount of variability is allowed within the mappable units. The range of characteristics tolerated within a series is discussed under the description of the various series.

A phase of a soil type is separated on the basis of those characteristics of the soil or landscape of which the soil is a part, that are of importance in land use but are not differentiating characteristics of the soil profile. Such factors as proximity of bedrock, important variations in relief or stoniness are common examples of phase differences.

The soil series developed on similar parent material but differing in characteristics of the solum due to differences of relief or drainage are included in the soil catena. The catenary relationship of the soils of Huron County is presented in this report.

Soil Descriptions

TABLE 5

DIFFERENTIATION OF HURON COUNTY SOILS ACCORDING TO SOIL MATERIALS AND DRAINAGE

A. SOILS DEVELOPED ON TILL

	Map Symbol	Acreage	% of Total
1. Light Textured Limestone Till Soils			
(a) Well drained — Grey-Brown Podzolic Great Soil Group			
(1) Dumfries loam	Dl	10,200	1.2
(2) Dumfries sandy loam	Ds	1,400	.17
(b) Imperfectly drained — Grey-Brown Podzolic Great Soil Group			
(1) Guerin loam	Gul	100	.01
(c) Poorly drained — Dark Grey Gleisolic Great Soil Group			
(1) Lyons loam	Lyl	500	.05
2. Medium Textured Limestone Till Soils			
(a) Well drained — Grey-Brown Podzolic Great Soil Group			
(1) Harriston loam	Hl	167,900	20.2
(2) Harriston silt loam	Hs	26,400	3.2

(b) Imperfectly drained — Grey-Brown Podzolic Great Soil Group			
(1) Listowel loam	Ll	35,500	4.2
(2) Listowel silt loam	Ls	13,600	1.6
(c) Poorly drained — Dark Grey Gleisolic Great Soil Group			
(1) Parkhill loam	Pal	13,800	1.6
(2) Parkhill silt loam	Pas	6,400	.7
3. Heavy Textured Till Soils			
(a) Well drained — Grey-Brown Podzolic Great Soil Group			
(1) Huron clay loam	Huc	90,100	10.9
(2) Huron silt loam	Hus	16,900	2.0
(b) Imperfectly drained — Grey-Brown Podzolic Great Soil Group			
(1) Perth clay loam	Pc	113,500	13.8
(2) Perth silty clay loam	Psc	500	.05
(3) Perth silt loam	Ps	3,000	.4
(c) Poorly drained — Dark-Grey Gleisolic Great Soil Group			
(1) Brookston clay loam	Bc	65,700	7.9
(2) Brookston silty clay loam	Bsc	12,000	1.4
(3) Brookston silt loam	Bs	1,100	.1

B. SOILS DEVELOPED ON OUTWASH SANDS AND GRAVELS

1. Coarse, Poorly Sorted, Gravelly Materials			
(a) Well drained — Grey-Brown Podzolic Great Soil Group			
(1) Donnybrook sandy loam	Ds	32,400	3.9
2. Well Sorted, Sandy Stratified Materials			
(a) Well drained — Grey-Brown Podzolic Great Soil Group			
(1) Fox sandy loam	Fs	500	.05
(b) Imperfectly drained — Grey-Brown Podzolic Great Soil Group			
(1) Brady sandy loam	Brs	7,000	.8
(c) Poorly drained — Dark Grey Gleisolic Great Soil Group			
(1) Granby sandy loam	Gs	7,200	.8
3. Well Sorted Gravelly Outwash Materials			
1. Dominantly grey in colour			
(a) Well drained — Grey-Brown Podzolic Great Soil Group			
(1) Burford loam	Bg	30,900	3.7
2. Dominantly very pale brown in colour			
(a) Well drained — Grey-Brown Podzolic Great Soil Group			
(1) Teeswater silt loam	Tes	26,900	3.3
(b) Imperfectly drained — Grey-Brown Podzolic Great Soil Group			
(1) Brisbane loam	Brl	1,200	.2
(c) Poorly drained — Dark Grey Gleisolic Great Soil Group			
(1) Gilford loam	Gil	3,500	.4
4. Outwash Sand Underlain by Heavy Clay Till			
(a) Well drained — Grey-Brown Podzolic Great Soil Group			
(1) Bookton sandy loam	Bos	3,100	.3
(b) Imperfectly drained — Grey-Brown Podzolic Great Soil Group			
(1) Berrien sandy loam	Bes	37,800	4.6
(c) Poorly drained — Dark Grey Gleisolic Great Soil Group			
(1) Wauseon sandy loam	Was	3,400	.4

C. LACUSTRINE SOILS

1. Stonefree Clay and Silt Loam Materials			
(a) Poorly drained — Dark Grey Gleisolic Great Soil Group			
(1) Toledo silt loam	Ts	1,200	.2
(2) Toledo clay loam	Tc	3,200	.4

D. RECENT ALLUVIAL MATERIALS

(a) Bottom Land	B.L.	58,100	7.0

E. ORGANIC SOILS

(a) Muck	M	33,900	4.1

A. SOILS DEVELOPED ON TILL

1. LIGHT TEXTURED LIMESTONE TILL SOILS

The light textured limestone till soils are developed on coarse open materials derived largely from dolomitic limestone. Often the materials are associated with terminal moraine deposits. These soils are quite stony and usually have a loam surface texture. The Dumfries catena, of which the Dumfries series is the well drained member; the Guerin series, the imperfectly drained member; and the Lyons series, the poorly drained member; occurs on these materials. Since the Guerin and Lyons series have been correlated with catenas not related to the Dumfries in Central Ontario, it has been necessary to change the names of these series to Killean and Lily. These names will be used in future reports.

(a) Well Drained

The Dumfries series exhibits the characteristics of the Grey-Brown Podzolic Great Soil Group. Two soil types, Dumfries loam and Dumfries sandy loam, are mapped in Huron County.

Dumfries loam (10,200 acres)

The topography is irregular steeply sloping. Erosion is severe owing to the topography which permits very rapid runoff.

Present forested areas consist chiefly of small woodlots where hard maple and beech are the dominant components of the association, with elm and birch occurring in smaller quantities.

The following is a generalized profile description of Dumfries loam examined under woodlot conditions.

A_0 — Thin layer of partially decomposed leaves and woody material.

A_1 — 0–4 inches dark brown (10 YR 4/3) loam; very fine granular structure; friable consistency; few large stones; pH 6.8.

A_{21} — 4–9 inches yellowish brown (10 YR 5/6) loam; fine granular structure; friable consistency; moderately stony; pH 6.7.

A_{22} — 9–11 inches pale brown (10 YR 6/3) sandy loam; slightly cemented; very weak platy structure; friable consistency; occasional stones; pH 6.6.

B_2 — 11–18 inches yellowish brown (10 YR 5/4) loam; medium nuciform structure; friable consistency; very stony; pH 7.2.

C — Light yellow-brown (10 YR 6/4) sandy loam; single grain structure; very stony and bouldery; calcareous; pH 7.4.

The parent material consists of coarse, open, light textured till, usually quite stony. The stones are angular or slightly rounded and vary in amount throughout the profile. Pockets of poorly sorted sand and gravel occasionally occur in association with the till.

Agriculture

Although much of the Dumfries loam has been cleared, cultivation is difficult due to the excessive number of stones and the hilly character of the land.

Where the land is cultivated, control of erosion and fertility maintenance present serious problems. Most general farm crops can be grown with moderate success. Since the Dumfries soils are susceptible to erosion, long term crop rotations should be used. Serious erosion can best be prevented by keeping the land under cover either by use of pasture crops or trees. Permanent pasture mixtures of red clover, alfalfa and timothy can be grown to provide good forage. Fertility can be maintained by the use of commercial fertilizers and barnyard manure. Clovers will help maintain and replenish the organic matter supply as well as add nitrogen to the soil if adequate phosphorus and potassium are present.

Dumfries sandy loam (1,400 acres)

The Dumfries sandy loam has a profile similar to that of the Dumfries loam with the exception of the A_1 and A_2 horizons which are sandy loam in texture and the solum in the lighter textured type is usually deeper.

The natural fertility of the series is low. Both the phosphate and potash contents are low and the organic matter content is also low.

(b) Imperfectly Drained

Guerin loam (100 acres)

This is an irregular gently sloping soil with imperfect drainage, and neutral in reaction. The soil is found only in a small area in West Wawanosh Township. It is correlated as a member of the Dumfries catena.

The natural vegetation consists mainly of elm, basswood and ash.

The following is a profile description taken in a woodlot.

A_0 — Thin layer of partially decomposed litter from grasses and deciduous trees.

A_1 — 0–6 inches dark brown (10 YR 4/3) loam; very fine granular structure; very friable consistency; large stones present; pH 7.2.

A_2 — 6–9 inches light yellowish brown (10 YR 6/4) loam; very fine crumb structure; very friable consistency; slightly mottled; few stones; pH 7.2.

B — 9–17 inches brown (10 YR 5/3) loam; fine nuciform structure; friable consistency; mottled; many stones; pH 7.3.

C — Light yellow-brown (10 YR 6/4) loam; single grain structure; mottling may occur in upper part of the horizon; gritty and bouldery; calcareous; pH 7.4.

The textures of the various horizons may vary from loam to sandy loam.

The natural fertility is low, organic matter, phosphate and potash all being required to raise the fertility level. The surface reaction is usually neutral ranging from pH 6.8 to pH 7.2.

Agriculture

Because of low fertility, imperfect drainage and stoniness this land is used for growing pasture and hay crops. Fairly good yields of buckwheat are obtained on the Guerin loam. Only a very small acreage of this soil type occurs in Huron County. Usually it occurs as pockets in association with another series and seldom is found in sufficiently large areas to receive special consideration for use and management. The Guerin loam responds to improved drainage. Occasionally stones occur in sufficiently large numbers to make cultivation difficult.

(c) Poorly Drained

Lyons loam (500 acres)

Lyons loam is the poorly drained member of the Dumfries catena and belongs to the Dark Grey Gleisolic Great Soil Group. Occurring on similar materials to the Dumfries and Guerin soils they are differentiated from them on the basis of drainage. Small scattered areas appear in West Wawanosh Township.

The topography is level to depressional and the runoff is very low and permeability is very slow. The natural vegetation consists mainly of elm, ash, basswood and white cedar.

The following is a generalized profile description of Lyons loam taken under natural forest conditions.

A_0 — Thin layer of partially decomposed litter from deciduous and coniferous trees.

A_1 — 0–8 inches black (10 YR 2/1) loam; fine granular structure; very friable consistency; many stones; pH 7.2.

G — 8–20 inches greyish brown (10 YR 5/2) sandy loam with medium brown mottlings increasing in intensity with depth; fine granular structure; friable consistency; very stony; pH 7.2.

C — Light grey (10 YR 7/2) sandy loam; many stones and boulders; single grain structure; pH 7.4.

Occasionally a thin layer of well decomposed organic soil lies over the A_1 horizon.

The natural fertility level is medium to low, the phosphate and potash content being low. Usually the organic matter and nitrogen content is medium to high. Artificial drainage would improve this soil but might be impractical because of stoniness.

Agriculture

Lyons loam is best used for pasture and woodlot growth. Poor natural drainage and medium to low natural fertility limit the number of crops that can be successfully grown on this soil type. Usually the Lyons loam occurs as small areas in association with better drained soils. Rarely does a farm occur only on this one soil type.

2. MEDIUM TEXTURED LIMESTONE TILL SOILS

The medium textured limestone till soils have developed on loamy, calcareous, stony materials. The till is easily recognized by its pale brown colour and by the presence of a fairly large number of stones. The stones are soft on the outside and are easily weathered. The presence of a large proportion of silt throughout the soil profile might be explained by the presence of these stones. A large proportion of the till materials is derived from the underlying bedrock, but a few precambrian stones and boulders are found scattered about the surface. The soils occur chiefly in the northern part of the County.

The Harriston series occupies the better drained sites on the drumlins and rolling till plains. The Listowel series is the imperfectly drained member of the Harriston catena, the Parkhill series being the poorly drained member of the same catena.

(a) Well Drained

Two types were mapped, Harriston loam and Harriston silt loam.

Harriston loam (167,900 acres)

Harriston loam is well drained and is fairly well supplied with plant nutrients. Because of the long smooth regular slopes the soil is moderately susceptible to sheet erosion.

Forested areas consist mostly of small woodlots in which hard maple is dominant, elm, ash and beech occurring less frequently.

The following is a profile description of Harriston loam developed under forest conditions.

A_0 — Thin layer of partially decomposed litter from deciduous trees.

A_1 — 0–6 inches dark greyish brown (10 YR 4/2) loam; fine granular structure; friable consistency; few stones; pH 7.0.

A_{21} — 6–15 inches dark yellow brown (10 YR 4/4) loam; fine platy structure; friable consistency; few stones; pH 6.8.

A_{22} — 15–19 inches pale brown (10 YR 6/3) loam; weak platy structure; friable consistency; few stones; pH 6.6.

B — 19–28 inches brown (10 YR 4/3) silty clay loam; medium nuciform structure; friable consistency; stony; pH 7.1.

C — Light yellow-brown (10 YR 6/4) silt loam; hard consistency; many stones; pH 7.7.

The bleached layer (A_{22} horizon) is not as well defined as in the grey limestone till soils possibly because it is masked by the pale brown colour. The stoniness varies and in some localities stones may interfere with cultivation.

The surface soil, when cultivated, is a dark brown loam usually 6–7 inches thick. The organic matter content is medium to low and the natural fertility is medium. The reaction is neutral to mildly alkaline (pH 7.0–7.5).

Agriculture

Most of the land has been cleared and only small woodlots of the original forest remain. General farming is common, with both beef and dairy cattle being kept on the farms. It is well adapted to corn, cereal grains, alfalfa, hay and pasture.

The soils are easily worked, but hilliness and stones may interfere with cultivation on a few small areas. The underlying material of these soils is lighter in texture than that of the Huron catena and allows more rapid percolation of moisture, permitting earlier spring cultivation. The rolling topography increases the susceptibility to sheet erosion, and soil management plans should include cropping practices that will slow up and if possible prevent

soil losses. Ploughing should follow the contours as much as possible, and cropping systems should be practised that will keep the land under vegetative cover for as large a proportion of time as possible to avoid erosion losses.

Clovers grow well and help to maintain and replenish the supply of organic matter as well as supplying nitrogen to the soil. Barnyard manure or green manure crops should be added to these soils to maintain the organic matter content and to increase soil fertility. Phosphatic and potassic fertilizers are required to maintain adequate levels of these plant nutrients.

The tapping of hard maple trees for maple syrup production provides a worthwhile income from the farm woodlot in many cases.

Harriston soils are very susceptible to erosion. Across the slope tillage would effectively control erosion in this field.

Harriston silt loam (26,400 acres)

The Harriston silt loam occurs in areas near the towns of Seaforth and Clinton. The parent material and the solum contain a larger proportion of silt than the loam profile. The level of plant nutrients is slightly higher in the silt loam than in the loam. The silt loam is also susceptible to sheet erosion.

(b) Imperfectly Drained

The Listowel series is the imperfectly drained member of the Harriston catena and is a hydromorphic associate of the Grey-Brown Podzolic Great Soil Group. Two soil types, Listowel loam and Listowel silt loam, occur in Huron County.

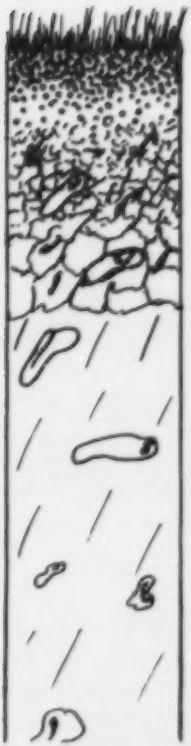
Listowel loam (35,000 acres)

The topography is generally undulating but in some areas is almost level. Both internal and external drainage are retarded, but the internal drainage

is better than in the soils developed on heavy-textured limestone till of similar topography. The Listowel loam does not suffer from erosion.

Present forested areas consist mainly of woodlots in which soft maple and elm occur most frequently, with lesser amounts of hard maple and beech. A few spruce may also be present.

The following is a generalized profile description of Listowel loam occurring under virgin conditions:



A_0 — Thin layer of partially decomposed litter from deciduous trees.

A_1 — 0–5 inches dark greyish brown (10 YR 4/2) loam; medium granular structure; very friable consistency; few stones; pH 7.0.

A_2 — 5–13 inches dark yellow-brown (10 YR 4/4) loam; fine nuciform structure; very friable consistency; mottlings appear in lower section of the horizon; few stones; pH 6.5.

B — 13–17 inches brown (10 YR 4/3) silt loam; medium nuciform structure; friable consistency; slightly mottled; stony; pH 7.2.

C — Light yellowish brown (10 YR 6/4) silt loam; yellowish brown mottlings; many stones; pH 7.7.

The A_2 horizon has a fine platy structure in some locations. The A_2 and B horizons are more poorly defined than in the Harriston soils because of the imperfect drainage.

The cultivated surface is a greyish brown loam approximately six inches deep. The organic matter and fertility levels are usually about medium. The soil reaction is usually neutral to slightly alkaline ranging from pH 6.8 to pH 7.4.

Agriculture

General farming is common. Most of the Listowel loam supports good growth of winter wheat, hay, oats and barley. Hay mixtures of timothy, red clover and alsike seem to be well suited for pasture and hay mixtures.

Drainage is the limiting factor for the growth of most crops, and better yields should be obtained where the drainage is improved. However, where the maintenance of organic matter has been neglected and the soil poorly managed in other ways, these soils become less productive. Additions of phosphate and potash are required to maintain fertility.

Where the drainage of permanent pastures is not improved, only clovers and grasses adapted to slow drainage can be grown. In areas where dairy farming occurs there is a need for legumes as a source of protein. Drainage improvement on the Listowel soils permits the growing of alfalfa and other valuable crops.

A good crop of alfalfa growing on drained Listowel. Tile drainage is effective on this series.

Listowel silt loam (13,600 acres)

The parent material and solum of Listowel silt loam contains a larger proportion of silt than the loam. The level of plant nutrients is slightly higher in the silt loam than in the loam.

(c) Poorly Drained

The poorly drained member of the Harriston catena is the Parkhill series. The series exhibits the characteristics of the Dark Grey Gleisolic Great Soil Group. Parkhill loam and Parkhill silt loam are the two types mapped.

Parkhill loam (13,800 acres)

Due to the level to slightly undulating topographical position of Parkhill loam, both internal and external drainage are poor. Areas of Parkhill loam mapped in Huron County are usually small and occur in the northeastern section of the County.

The natural vegetation consists mainly of soft maple, elm and ash. White cedar and willow are also present.

The following is a generalized profile description of Parkhill loam that occurs under a forest vegetative cover.

A_0 — Thin layer of partially decomposed litter from deciduous trees.

A_1 — 7 inches very dark greyish brown (10 YR 3/2) loam; coarse granular structure; very friable consistency; occasional stones; pH 7.3.

G — 7–27 inches grey-brown (10 YR 5/2) silt loam; yellowish brown mottlings increasing in intensity with depth; fine nuciform structure; friable consistency; pH 7.3.

C — Light yellowish brown (10 YR 6/4) silt loam; yellowish brown mottlings; many stones; pH 7.7.

Lacustrine materials are occasionally intermixed with the till, particularly in the lower topographic position.

The surface soil when cultivated is a black loam approximately eight inches thick. This layer is dark in colour and has a high organic matter content which reflects the poor drainage conditions. The supply of available nutrients is medium and the organic matter content is high. The reaction of the surface soil is neutral to slightly alkaline.

Often small areas of Parkhill soils, too small to be delineated on an inch to the mile scale of mapping, are included with the better drained catenary members. It is advisable to underdrain such areas so they will fit into the management programme on the better drained soils.

Agriculture

Poor drainage limits the use of Parkhill soils for the production of general farm crops. Fair yields of hay and pasture crops are obtained. Buckwheat is commonly grown since it can be planted later in the spring than the other cereal crops. Woodlots are commonly found on the Parkhill soils. Unsatisfactory drainage is the chief problem on this series. However, once drainage is improved, organic matter and fertility maintenance are important.

Parkhill loam is a poorly drained soil. Reliability of the soil is greatly increased when tile drained.

Parkhill silt loam (6,400 acres)

The Parkhill silt loam occurs in the Clinton district. The use and management are similar to those of the Parkhill loam. The silt loam contains less stones and the fertility levels are slightly higher than in the loam.

3. HEAVY TEXTURED LIMESTONE TILL SOILS

The heavy textured till soils are developed on clayey calcareous till derived largely from the Norfolk limestone and to a lesser extent from shale. The unweathered or slightly weathered drift contains angular stones and the occasional boulder interspersed among a clayey matrix.

The Huron catena, of which the Huron series is the well drained member, the Perth series the imperfectly drained member, and the Brookston series the poorly drained member, occurs on these materials.

(a) Well Drained

The Huron series exhibits the characteristics of the Grey-Brown Podzolic Great Soil Group. Huron clay loam and Huron silt loam occur in the County.

Huron clay loam (90,100 acres)

The topography ranges from smooth gently sloping to smooth steeply sloping. Occasionally slopes in excess of 15% occur along stream courses. The Huron soils are susceptible to erosion.

Present forested areas consist chiefly of small woodlots where the maple-elm association is dominant. Trees such as hard maple, beech, elm and ash are common.

The following is a generalized profile description of Huron clay loam examined under forest cover.

A_0 — Thin layer of partially decomposed litter from deciduous trees.

A_1 — 0–6 inches very dark grey (10 YR 3/1) clay loam; fine granular structure; very friable consistency; pH 6.9.

A_2 — 4–10 inches brown (10 YR 5/3) clay loam; medium nuciform structure; friable consistency; few stones; pH 6.8.

B — 10–20 inches dark grey-brown (10 YR 4/2) clay; coarse nuciform structure; hard consistency; few stones; pH 7.0.

C — Pale brown (10 YR 6/3) clay loam; medium blocky structure; brittle consistency when dry; plastic when wet; stony; few boulders; pH 7.8.

In some locations a grey or bleached A_{22} horizon may be present. This horizon is slightly cemented, stonefree, and is usually 2–3 inches thick.

Chemical tests show that the levels of available calcium, magnesium and potash are medium to high. The soils are low in phosphorus, while the organic matter content is medium.

Agriculture

Originally supporting good stands of hardwood forest, most of the land is now cleared and used for agricultural purposes. Good yields of winter wheat, cereal grains, alfalfa, red clover, timothy and corn can be obtained.

The Huron clay loam belongs to the Grey-Brown Podzolic Great Soil Group. Note the well-defined A_1, A_{21}, A_{22}, B and C horizons.

Tree fruits, especially apples, might do well on the Huron series south of Goderich and near the lake where the weather is more temperate.

A satisfactory farm management programme should include ways of preventing the loss of soil due to erosion. Erosion presents a problem where the slopes are steep and runoff is rapid. Much of this soil loss can be prevented by use of remedies such as contour cultivation, grassed waterways, cover crops and long rotations. Commercial fertilizers should be applied to maintain soil fertility.

To maintain a satisfactory physical condition in the Huron soils adequate organic matter levels are necessary. When the organic matter content is low the granular structure is destroyed and the soil has a tendency to puddle and

bake. Unsatisfactory physical conditions can be improved through the use of barnyard manure. Since livestock is present on most of the farms, a good supply of barnyard manure is usually available to return to the soil. Clovers grow well and will help to maintain and replenish the organic matter supply as well as add nitrogen.

Huron silt loam (16,900 acres)

The Huron silt loam occurs in the northern part of the County and differs from the clay loam in surface texture only. The land use and management is similar to that discussed for the clay loam.

(b) Imperfectly Drained

The imperfectly drained member of the Huron catena is the Perth series which exhibits the characteristics of the Grey-Brown Podzolic Great Soil Group. Perth clay loam, Perth silty clay loam and Perth silt loam are mapped in Huron County.

Perth clay loam (113,500 acres)

The topography is smooth gently sloping, the natural drainage is imperfect, and the reaction ranges from neutral to slightly alkaline.

Elm, ash and soft maple are dominant in the woodlot areas, with some hard maple and the occasional pine also present. The elm-ash association favours the development of a soil in which the humus is well incorporated with the mineral portion.

The following is a generalized description of Perth clay loam developed under forest and fair drainage conditions.

A_0 — Thin layer of partially decomposed litter from deciduous trees.

A_1 — 4 inches very dark grey (10 YR 3/1) clay loam; fine granular structure; very friable consistency; pH 7.1.

A_2 — 4–8 inches pale brown (10 YR 6/3) silty clay loam; medium nuciform structure; friable consistency; mottled; pH 6.8.

B — 6–14 inches brown (10 YR 4/3) clay; coarse nuciform structure; hard consistency; few stones; mottled; pH 7.0.

C — Light grey-brown (10 YR 6/2) clay loam; fragmental structure; brittle consistency when dry; plastic consistency when wet; few to frequent stones; pH 7.8.

The profile development of the Perth soils has been retarded by somewhat excessive moisture content and in some instances the A_2 and B horizons may be so poorly defined that differentiation of the two horizons is difficult.

The natural fertility is medium. In most cases the phosphorus level is low. The organic matter content is medium to high. The surface reaction varies from neutral to slightly alkaline ranging from pH 6.8 to pH7.4. The structure of the surface soil is fine granular and a satisfactory physical condition can be fairly easily maintained provided the organic matter content is not depleted.

Agriculture

Perth soils are well adapted to the growth of oats, hay, pasture and mangolds and are fairly well suited for such crops as barley, wheat and clover. In the northern part of the County the soils are used for general farming purposes, while in the southern section specialized crops such as beans, canning crops, etc., are grown. Peas and beans are grown extensively in Stanley, Stephen, Tuckersmith and Hay Townships where good yields are obtained. Beets, corn and cabbages are grown to a lesser extent. A large proportion of the canning crops grown in Huron County are processed in the factory located in Exeter. Flax is a common crop grown in the Seaforth area. Buck-

wheat is often grown during wet seasons, since it has a short growing season and therefore usually produces good crops even when spring planting is quite late.

During dry seasons the Perth soils usually produce good yields because of their fairly high moisture reserve. However, if maintenance of organic matter is neglected and the soil poorly managed in other ways, they become, in time, difficult to work and less productive. It is difficult to attain optimum production on the Perth soils unless the drainage is artificially improved.

The saucer-shaped depression in an area of Perth soil is difficult to drain.

Perth silty clay loam (500 acres) and

Perth silt loam (3,000 acres)

These types differ from the clay loam in the surface texture only. The use and management associated with Perth silty clay loam and Perth silt loam are similar to those discussed for the clay loam.

(c) Poorly Drained

The Brookston series is the poorly drained member of the Huron catena and exhibits the characteristics of the Dark Grey Gleisolic Great Soil Group. Soil types mapped are Brookston clay, Brookston silty clay loam, and Brookston silt loam.

Brookston clay loam (65,700 acres)

The topography is level, and both the internal and external drainage are slow. Drainage can be improved with the use of tile drains or open ditches. Open ditches already installed along the lakeshore appear to be suffering from gully erosion, particularly during the spring when large volumes of water are dumped on the level land from areas of higher elevation. In attempting to improve the drainage of the Brookston, susceptibility to gully erosion should be kept in mind.

The natural vegetation consists of elm, ash, basswood and white cedar. In some areas silver birch, mountain ash, spruce and soft maple are also

present. In common with Perth soils, this vegetation has resulted in a surface soil in which the organic matter is well incorporated with the mineral matter.

The following is a generalized profile description of Brookston clay loam as found under natural forest conditions.

A_0 — Thin layer of partially decomposed litter from deciduous trees.

A_1 — 0–8 inches very dark brown (10 YR 2/2) clay loam; fine granular structure; very friable consistency; pH 7.1.

G — 8–22 inches mottled clay loam, colour of mass is light grey-brown (10 YR 6/2); mottlings yellow-brown (10 YR 5/4) increasing in intensity with depth; coarse blocky structure; hard consistency; grit and stones present; pH 7.2.

C — Grey-brown (10 YR 5/2) clay; mottled; coarse blocky structure; consistency hard when dry and plastic when wet; gritty; pH 7.8.

Agriculture

In the northern half of Huron County the Brookston soils are used largely for growing cereal grains, hay, pasture, field peas and flax. However, in the southern part of the county such crops as sugar beets, field beans, tomatoes, canning crops, etc., are grown in addition to those mentioned for the northern part. The wider range of crops that grow in the southern half of the county reflects the influence of the climate in that area.

Unsatisfactory drainage is the chief limitation that affects the Brookston soils for the growing of most farm crops. With the exception of phosphorus, these soils are inherently fairly well supplied with plant nutrients. Unless adequate organic matter levels are maintained unsatisfactory physical conditions may develop. When such a condition prevails, the drainage problem is aggravated because of the lowered permeability.

Gully erosion is common on the Brookston soils, particularly along the stream courses that empty into Lake Huron. Deep active gullies present a problem in the utilization and manipulation of farm machinery. Control measures are urgently needed to overcome the gully erosion hazards.

Provided the drainage is improved and good sound soil management is practised, the Brookston soils produce good yields of crops commonly grown in the area.

Brookston silty clay loam (1,200 acres) and Brookston silt loam (1,100 acres)

The Brookston silty clay loam and Brookston silt loam differ in texture

of the surface soil from the Brookston clay loam. The general characteristics, use and management are similar to those discussed in the clay loam.

B. SOILS DEVELOPED ON OUTWASH SANDS AND GRAVELS

1. COARSE POORLY SORTED GRAVELLY OUTWASH

The materials of the fluvio-glacial deposits are derived largely from limestone bedrock and consist of coarse poorly sorted gravel and included pockets of coarse till and sand. The fluvio-glacial materials often occur as kames and eskers.

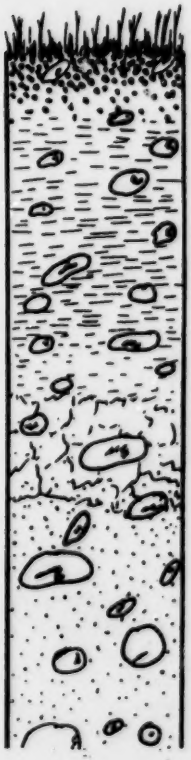
(a) Well Drained

Donnybrook sandy loam (32,400 acres)

Donnybrook sandy loam is the only type mapped in the series. It is also the only catenary member mapped. The profile exhibits Grey-Brown Podzolic characteristics.

Donnybrook sandy loam has irregular steeply sloping topography and good to excessive natural drainage. The soil has developed under a forest cover consisting of maple, ash and beach.

The following is a generalized profile description of Donnybrook sandy loam.



A_0 — Thin layer of partially decomposed leaf litter.

A_1 — 0–5 inches dark brown (10 YR 4/3) sandy loam; fine crumb structure; very friable consistency; stones few to frequent; pH 7.2.

A_{21} — 5–21 inches yellow brown (10 YR 5/6) sand; very weak platy structure; gravelly; very friable consistency; pH 7.0.

A_{22} — 21–24 inches pale brown (10 YR 6/3) sand and gravel; very weak platy structure; friable consistency; pH 6.8.

B — 24–31 inches dark brown (10 YR 4/3) sandy loam and gravel; very weak nuciform structure; friable consistency; few stones present; pH 7.4.

C — Very pale brown (10 YR 7/3) poorly sorted sand and gravel; single grain structure; few to frequent stones; calcareous; pH 7.8.

Where the Donnybrook is mapped on eskeroid materials the horizons in the profile are often poorly defined. Usually there is a dark coloured surface layer, underlain by dark brown sandy loam which grades into the pale brown parent material. The stoniness is variable.

The cultivated surface soil is a dark brown sandy loam about five inches deep. The natural fertility is medium to low and the organic matter content is low. The surface reaction varies from pH 6.6 to pH 7.5.

Donnybrook sandy loam is a member of the Grey-Brown Podzolic Great Soil Group. It is developed on poorly sorted material consisting mainly of gravel with pockets of till and sand also present.

Agriculture

Most of the Donnybrook sandy loam has been cleared and is used for general farming purposes. Fair yields of cereal grains, hay and pasture are obtained. A fairly large proportion of the series is used for permanent pasture particularly where the topography is irregular steeply sloping to irregular very steeply sloping. The Donnybrook soils are susceptible to and have suffered extensively from erosion. The complex topography is not suited to contour cultivation and strip cropping. Consequently, erosion control measures consist

of keeping the soil under cover for as long periods as possible and practising a minimum of cultivation.

The Donnybrook sandy loam responds to applications of potassic and phosphatic fertilizers. Maintenance of adequate organic matter content is necessary for satisfactory yields. The rapid internal drainage and high surface runoff permit early spring cultivation which is an advantage over the heavy textured, imperfectly and poorly drained soils.

Much unimproved pasture occurs on the hilly Donnybrook sandy loam.

2. WELL SORTED SANDY MATERIALS

The well sorted materials were deposited in still or slowly moving water and occur as calcareous gravelly or sandy outwash deposits which assume the form of sand bars, outwash plains, or beaches. The sandy materials are members of the Fox catena, of which the Fox is the well drained member, the Brady the imperfectly drained member, and the Granby the poorly drained member. The Fox and Brady series exhibit the characteristics of the Grey-Brown Podzolic Great Soil Group while the Granby soils belong to the Dark Grey Gleisolic Great Soil Group.

(a) Well Drained

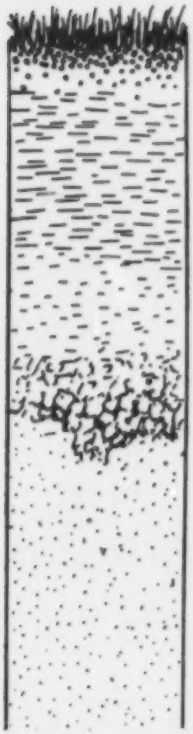
Fox sandy loam (500 acres)

The Fox sandy loam is the well drained member of the catena bearing the same name. It is developed on well sorted sandy materials. The surface reaction of the Fox series, as mapped in Huron County, is usually slightly to moderately alkaline.

The topography is smooth gently sloping. The Fox sandy loam has not been seriously affected by erosion except along stream courses where fairly steep slopes may occur.

The natural vegetation in present woodlots consists mainly of hard maple and beech.

The following is a generalized profile description of Fox sandy loam.



A_0 — Thin layer of partially decomposed litter from deciduous trees.

A_1 — 0–5 inches very dark grey (10 YR 3/1) sandy loam; very fine crumb structure; very friable consistency; stonefree; pH 6.6.

A_{21} — 5–16 inches yellow-brown (10 YR 5/6) sand; weak platy structure; very friable consistency; stonefree; pH 6.4.

A_{22} — 16–22 inches pale brown (10 YR 6/3) sand; very weak platy structure; very friable consistency; stonefree; pH 6.0.

B — 22–30 inches dark brown (10 YR 4/3) sandy loam; very fine nuciform structure; very friable consistency; stonefree; pH 6.8.

C — Light yellowish brown (10 YR 6/4) sand; single grain structure; stonefree; calcareous; pH 7.8.

Under virgin conditions a weak Podzol profile may occur in the A_2 horizon of the former Grey-Brown Podzolic profile.

The cultivated surface is a greyish brown sandy loam approximately six inches deep. The organic matter and available nutrient content is usually low.

Agriculture

Fox sandy loam occupies a very small area in Huron County. However, where this soil is present, it is used for general farming. Provided satisfactory fertility levels are maintained, fair to good yields of cereal grains, hay, pasture and potatoes are obtained.

The soil is one which is quite easily cultivated but requires the addition of commercial fertilizers and barnyard manure to get best results. The internal drainage is rapid which permits early spring cultivation. If this type occurs close to the lake shore where the climate is more temperate, fruit growing can be carried on with fair success.

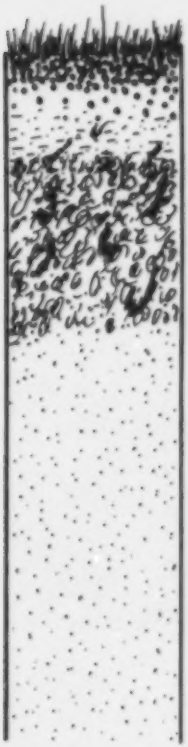
(b) Imperfectly Drained

Brady sandy loam (7,000 acres)

Brady sandy loam is the imperfectly drained member of the Fox catena and is found in small areas south of the town of Goderich. The topography ranges from smooth gently sloping to smooth moderately sloping. The internal drainage is moderate and the external drainage is low.

The natural vegetation consists mainly of soft maple, elm, aspen, and a few white spruce.

The following is a generalized profile description of Brady sandy loam as found under forest growth.



A_0 — Thin layer of partially decomposed litter from deciduous trees.

A_1 — 0–4 inches very dark grey (10 YR 3/1) sandy loam; very fine crumb structure; very friable consistency; stonefree; pH 6.5.

A_2 — 4–8 inches yellowish brown (10 YR 5/6) sand; single grain to very weak platy structure; very friable consistency; mottled; pH 5.9.

B — 8–20 inches dark brown (10 YR 4/3) sand; coarse crumb structure; friable consistency; stonefree; slightly mottled; pH 6.4.

C — Light yellowish brown (10 YR 6/4) sand; single grain structure; stonefree; calcareous; pH 7.8.

Occasionally the B horizon of the Grey-Brown Podzolic is very weakly developed and the solum exhibits characteristics of the Brown Podzolic Soils.

The cultivated surface is a very dark grey sandy loam approximately five inches deep. The fertility level is medium to low, the amounts of available phosphorus, potash, calcium and magnesium all being low. The organic matter content is medium. The surface reaction is usually slightly acid to neutral.

Agriculture

Most of the Brady sandy loam has been cleared and is producing general

farm crops. Imperfect natural drainage limits the range of crops that can be grown. A fair proportion of the Brady sandy loam occurs close to the Lake Huron shores. If the drainage were improved, it would not only permit the growing of a wide range of general farm crops but would also make the type better suited for orchard purposes.

Drainage improvement and maintenance of adequate organic matter and plant nutrient levels are the chief requirements of the Brady sandy loam for successful crop production. When the drainage is improved, the use and management problems associated with the Fox sandy loam are also common to the Brady sandy loam.

(c) Poorly Drained

Granby sandy loam (7,200 acres)

The Granby series is the poorly drained member of the Fox catena and is a representative of the Dark Grey Gleisolic Great Soil Group.

The topography ranges from level to depressional. The drainage is poor, with runoff being very low and permeability slow. The water table occurs close to the surface in the spring. There is a close relationship between the level of the water table and the amount and occurrence of precipitation. Often the Granby series occurs in saucer-shaped areas making it particularly difficult to drain.

The natural vegetation in present woodlots consists of white cedar, aspen, and elm.

The following is a generalized profile description of Granby sandy loam as found under woodlot conditions.

A_0 — Thin layer of partially decomposed leaf litter.

A_1 — 0–8 inches black (10 YR 2/1) sandy loam; fine granular and very fine crumb structure; very friable consistency; stonefree; pH 7.0.

G — 8–22 inches yellow-brown (10 YR 5/6) sand with low contrast mottlings; mottlings increase in intensity with depth; single grain structure; friable consistency; stonefree; pH 7.0.

C — Light yellow-brown (10 YR 6/4) sand; single grain structure; friable consistency; stonefree; calcareous; pH 7.8.

The cultivated surface is very dark grey sandy loam eight to ten inches deep. The organic matter content is medium to high, but the levels of available phosphorus and potash are low. The surface reaction is about neutral.

Agriculture

A large proportion of the Granby sandy loam is used for permanent pasture or is under tree cover. It is doubtful if this soil can be successfully used for general farm purposes unless the drainage is improved. Once drainage improvement is effected, the organic matter and fertility levels must be maintained. Under present natural drainage conditions much of the Granby sandy loam would serve a useful purpose if reforested.

3. WELL SORTED GRAVELLY OUTWASH MATERIALS

The well sorted gravelly deposits occur as beaches, or outwash plains along the main drainage channels of the County. Two catenas occur on the gravelly outwash materials, the Burford and the Teeswater. The soils of the Burford catena are separated from those of the Teeswater on the basis of the colour and petrographic composition of the underlying gravel. In the former

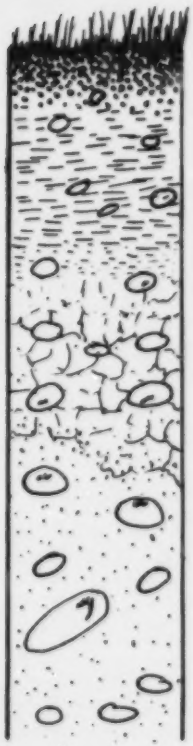
the gravel is dominantly grey in colour while in the latter it is dominantly a very pale brown colour.

(a) Well Drained

Burford loam (30,900 acres)

The Burford loam is developed on gravelly materials derived largely from dolomitic limestone. The Burford is the well drained member of the catena bearing the same name, the Brisbane being the imperfectly drained member and the Gilford the poorly drained member. The Burford loam is a Grey-Brown Podzolic soil.

The following is a generalized profile description:



A_0 — Thin layer of partially decomposed leaf litter.

A_1 — 0–5 inches dark brown (10 YR 4/3) gravelly loam; fine granular structure; very friable consistency; pH 6.5.

A_{21} — 5–14 inches yellowish brown (10 YR 5/6) gravelly loam; very fine platy structure; very friable consistency; pH 6.5.

A_{22} — 14–16 inches light yellowish brown (10 YR 6/4) loam; slightly compacted; very weak platy structure; friable consistency; bleached appearance; pH 6.3.

B — 16–27 inches brown (10 YR 5/3) clay loam; frequently gravelly; medium nuciform structure; friable consistency; pH 7.0.

C — Very pale brown (10 YR 7/3) well sorted gravelly and cobbly material; occasional layer of sand may be present; calcareous; pH 7.8.

In some areas the surface soil contains a large number of gravel stones. Occasionally, however, there is a relatively stonefree overburden covering the underlying gravel.

The cultivated surface is a greyish brown gravelly loam about six inches deep. The organic matter content is medium, the levels of phosphorus and potassium are low while those of calcium and magnesium are medium.

Agriculture

These soils are well suited to hay and pasture crops and fairly well adapted to small grains, corn, sweet clover and alfalfa.

The B horizon of the Burford loam rests on the well sorted, gravelly, calcareous, parent material.

A strip of Burford loam near Lake Huron and south of Goderich is influenced by the moderating effect of the lake. The weather is such that strawberries, raspberries, grapes and orchard fruits should do quite well even though some of the more tender fruits may not be grown successfully. The nearness of the various summer resorts could make the growing of small fruits quite profitable.

Good yields are obtained from row crops on these soils, and peas, field beans, soybeans, turnips and mangolds can be grown successfully.

Fertility maintenance is of first importance as a factor in good soil management. Commercial fertilizers should be used to increase and maintain the levels of available phosphorus and potassium. Clovers included in the rotation help to maintain an adequate supply of nitrogen.

2. WELL SORTED GRAVELLY OUTWASH MATERIALS, DOMINANTLY VERY PALE BROWN IN COLOUR

The Teeswater silt loam is developed on well sorted gravelly outwash materials. The underlying gravel consists largely of dolomitic limestone and

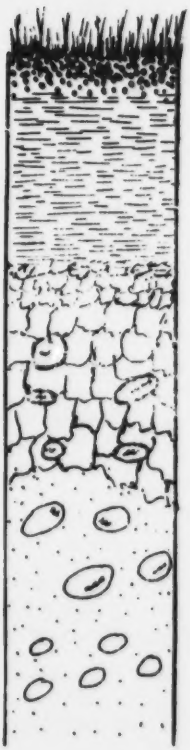
is very pale brown in colour. The gravelly materials of the Teeswater series appear to be of the same origin as the pale brown till fragments in the Harriston catena. Usually a stonefree silty overburden covers the underlying gravel to a depth of 15 to 30 inches. Only the well drained member has been mapped. The imperfectly and poorly drained condition was not found in extensive areas and where mapped it was correlated with the Brisbane and Gilford series of the Burford catena. The Teeswater silt loam is a Grey-Brown Podzolic soil. Only the silt loam type was mapped in the Teeswater series.

(a) Well Drained

Teeswater silt loam (26,900 acres)

The Teeswater silt loam occurs as outwash plains along the Maitland and Saugeen Rivers. The natural drainage is good, the surface runoff being medium to low and the internal drainage moderate to rapid. The topography ranges from smooth gently sloping to smooth moderately sloping. The natural vegetation consists largely of beech and hard maple, and some ironwood, butternut and rock elm.

The following is a generalized description of Teeswater silt loam.



A_0 — Thin layer of partially decomposed leaf litter.

A_1 — 0–3 inches greyish brown (10 YR 5/2) silt loam; fine granular structure; very friable consistency; usually stonefree; pH 6.3.

A_{21} — 3–15 inches light yellow-brown (10 YR 6/4) silt loam; weak platy structure; very friable consistency; stonefree; pH 6.0.

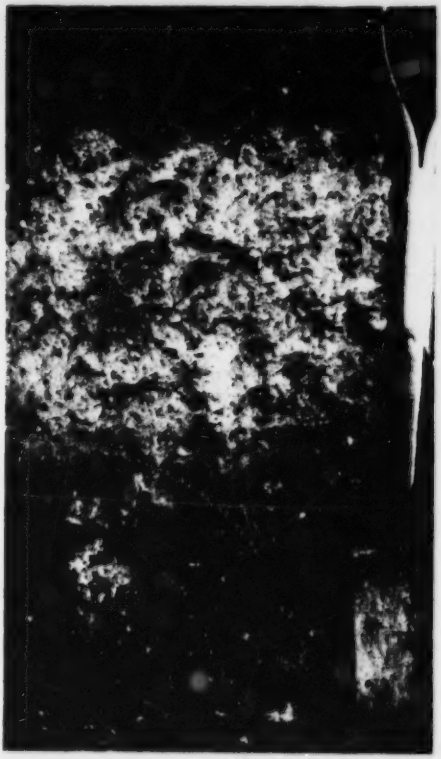
A_{22} — 15–18 inches very pale brown (10 YR 7/3) silt loam; fine nuciform structure; friable consistency; stonefree; pH 5.9.

B — 18–29 inches dark brown (7.5 YR 3/2) clay loam; medium nuciform structure; hard consistency; stony; pH 7.0.

C — Very pale brown (10 YR 7/3) sand and gravelly material; well sorted; calcareous; pH 7.8.

The stonefree silty overburden is usually about 30 inches deep. Occasionally the underlying gravelly materials may come to the surface. The cultivated

surface soil is a brown silt loam about six inches deep. The Teeswater silt loam is fairly well supplied with calcium and potassium, is medium to low in phosphorus, and has a medium organic matter content.



The stonefree silty overburden is deep in this Teeswater silt loam profile.

Agriculture

The Teeswater silt loam is well suited to the production of general farm crops which include cereal grains, hay and pasture. Good yields of potatoes are also obtained and, if the climate is satisfactory, vegetables and tree fruits may also be grown successfully. The underlying gravelly materials provide moderate internal drainage and thus permit early spring cultivation. The good natural drainage, smooth gently sloping topography and good physical condition make the Teeswater a reliable and good soil. Maintenance of adequate levels of organic matter, phosphorus and potassium is necessary for satisfactory yields. The Teeswater silt loam has not been seriously affected by erosion.

(b) Imperfectly Drained

Brisbane loam (1,200 acres)

Brisbane loam is the imperfectly drained member of the Burford catena.

Good grass-legume pastures benefit both soil and livestock.

The horizons are less well defined than in the well drained member, but the soil still exhibits the characteristics of the Grey-Brown Podzolic Great Soil Group.

The topography is smooth gently sloping and erosion does not present a problem. The natural vegetation consists mainly of hardwoods, of which sugar maple, beech, soft maple and ash occur most frequently. Silver birch and black walnut are also present in some locations.

The following is a profile description of Brisbane loam as found under virgin conditions.

A_0 — Thin layer of partially decomposed leaf litter.

A_1 — 0–5 inches very dark grey (10 YR 3/1) loam; stony; very fine granular structure; very friable consistency; pH 7.2.

A_2 — 5–11 inches light yellow-brown (10 YR 6/4) loam; fine platy structure; very friable consistency; mottled; pH 7.0.

B — 11–21 inches yellowish brown (10 YR 5/4) gravelly loam; mottled; medium nuciform structure; friable consistency; pH 7.4.

C — Very pale brown (10 YR 7/3) gravelly and cobbly outwash materials; occasional sand strata; calcareous; pH 7.6.

The cultivated surface is a very dark grey loam about six inches deep. The organic matter and available nutrient content is medium to low. The surface reaction is about neutral.

Agriculture

Imperfect drainage limits the number of crops that can be grown on the Brisbane loam. Most of this soil has been cleared and is used for the production of general farm crops. Fair to good yields of cereal grains, hay and pasture are obtained. The unsatisfactory moisture conditions will not permit the inclusion of alfalfa in the hay and pasture mixtures unless the soil is artificially drained. The Brisbane loam does not occur in large expanses but usually as small areas in association with better drained soils. The phosphorus levels are medium to low, and the potassium and calcium levels medium. The organic matter content is medium. The Brisbane loam under natural drainage conditions responds to fertilizer treatment. If, however, the drainage is improved, the usefulness of the soil is greatly increased.

(c) Poorly Drained

Gilford loam (3,500 acres)

Gilford loam is the poorly drained member of the Burford catena and is representative of the Dark Grey Gleisolic Great Soil Group.

The topography is level to depressional. The water table is high and the runoff is very low.

The natural vegetation consists of both deciduous and coniferous trees with soft maple, ash, elm, aspen and white cedar being most common.

The following is a generalized profile description:

A_0 — Thin layer of partially decomposed leaf litter.

A_1 — 0–7 inches very dark brown (10 YR 2/2) gravelly loam; very fine granular structure; very friable consistency; pH 7.0.

G — 7–27 inches light yellowish brown (10 YR 6/4) loam; mottlings increasing in intensity with depth; fine nuciform structure; friable consistency; pH 7.0.

C — Very pale brown (10 YR 7/3) gravel and cobbles; well sorted; sand strata may be present; calcareous; pH 7.8.

The cultivated surface soil is dark brown to black in colour, approximately eight inches deep. The organic matter content is high and the content of available nutrients is medium. The surface reaction is usually about neutral.

Agriculture

Much of the Gilford loam mapped in Huron County has been cleared and at one time was used for the production of general farm crops. Because of

poor natural drainage, spring planting is often delayed on the Gilford loam and a large proportion of it has reverted to permanent pasture. When the soil is cultivated, spring grains, hay and pasture are produced. In late seasons buckwheat is often the only grain crop that is planted. The Gilford loam is well supplied with organic matter, the phosphorus and potassium levels being similar to those in the Brisbane and Burford series. To produce satisfactory yields of farm crops on the Gilford loam, drainage improvement is of prime importance.

4. OUTWASH SANDY MATERIALS UNDERLAIN BY HEAVY CLAY TILL

The outwash sandy materials were deposited as a result of wave action in the post glacial lakes. They usually occur in association with old beach lines, the overburden of sand being spread out over the underlying clay till to depths of three feet and less. The Bookton catena occurs on these materials. Three catenary members were mapped in Huron County, the well drained member, Bookton sandy loam, the imperfectly drained member, Berrien sandy loam, and the poorly drained member, Wauseon sandy loam.

(a) Well Drained

Bookton sandy loam (3,100 acres)

The Bookton sandy loam is a well drained, slightly acid soil underlain by heavy clay till at depths of three feet and less. The topography is smooth gently sloping to smooth moderately sloping. The natural drainage is good and the internal drainage is rapid, the surface runoff being low. Hard maple, beech and basswood are the trees most commonly found in the woodlots. The profile exhibits the characteristics of the Grey-Brown Podzolic Great Soil Group. The following profile description is typical of Bookton sandy loam developed under tree cover.

A_0 — Thin layer of partially decomposed leaf litter.

A_1 — 0–3 inches very dark grey (10 YR 3/1) sandy loam; fine crumb structure; stonefree; very friable consistency; pH 6.7.

A_2 — 3–5 inches greyish brown (10 YR 5/2) sand; stonefree; single grain structure; very friable consistency; pH 6.0.

B_2 — 5–15 inches dark brown (10 YR 4/3) sand; single grain structure; stonefree; very friable consistency; pH 6.8.

B_3 — 15–23 inches brown (10 YR 5/3) sand; single grain structure; stonefree; very friable consistency; pH 6.9.

C — 23–25 inches greyish brown (10 YR 5/2) sand; calcareous; pH 7.8.

D — Heavy grey (10 YR 5/1) clay till; coarse fragmental structure; gritty; calcareous; friable; few stones; pH 8.1.

The depth of sandy overburden is variable. Usually the heavy clay till occurs at depths of about 30 inches.

The cultivated surface is a brown sandy loam about six inches deep. The organic matter content is low and the content of available nutrients is low. The surface reaction is neutral to slightly acid.

Agriculture

The Bookton sandy loam is used for general farming. The sandy overburden is low in plant nutrients and organic matter. The underlying heavy materials are better supplied with plant nutrients than the sandy overburden. The type is fairly well suited to the production of cereal grains, hay and pasture. Provided the climatic environment is satisfactory, small fruits, vegetables and tree fruits should grow well. Maintenance of adequate fertility and organic matter levels are the chief soil problems associated with this type.

(b) Imperfectly Drained

Berrien sandy loam (37,800 acres)

Berrien sandy loam is the imperfectly drained member of the Bookton catena. An extensive area occurs in Huron County running parallel with the Lake Huron shore.

The topography is smooth gently sloping. The natural drainage is imperfect, and the runoff is low. The underlying fine textured materials inhibit the downward movement of the soil moisture.

The natural vegetation consists of deciduous and coniferous trees. Ash, soft maple and sycamore are the most common deciduous trees found. Coniferous trees such as hemlock, white cedar and spruce are also common.

The following is a generalized profile description of Berrien sandy loam:

A_0 — Thin layer of partially decomposed leaf litter.

A_1 — 0–7 inches dark grey-brown (10 YR 4/2) sandy loam; fine granular structure; stonefree; very friable consistency; pH 7.0.

A_2 — 7–10 inches light grey-brown (10 YR 6/2) sand; single grain structure; stonefree; very friable consistency; pH 6.8.

B_2 — 10–19 inches brown (10 YR 5/3) sand; single grain structure; mottled; hard consistency; pH 7.2.

B_3 — 19–29 inches yellowish brown (10 YR 5/6) sand; dark brown mottlings; mottles increase in intensity with depth; single grain structure; friable consistency; pH 7.2.

C — 29–32 inches greyish brown (10 YR 5/2) gravel and sand; frequent stones; calcareous; pH 7.8.

D — Grey (10 YR 5/1) clay till; fragmental structure; plastic consistency when wet; hard consistency when dry; calcareous; pH 8.1.

The heavy clay till usually appears at depths of three feet or less. In many localities the Berrien sandy loam has developed characteristics typical of the Ground Water Podzol Great Soil Group. Ground Water Podzol soils usually develop from sandy parent material in situations of imperfect drainage. An A_1 horizon, usually two or three inches thick, overlies a thin, light grey A_2 horizon. Below this is a dark brown B horizon with an accumulation of iron or humus or both. The B horizon is often cemented or indurated.

Although an arbitrary depth of three feet and less of sandy overburden has been established for the Berrien series, occasionally the depth of sandy deposits are more variable. In places the clay may come to the surface between sandy swells. The C horizon of gravel and sand may be entirely absent in some areas.

The cultivated surface is dark brown sandy loam approximately seven inches deep. The organic matter content is medium and the levels of available phosphorus and potassium are low. The surface reaction is usually neutral except in areas where a Podzol type of profile occurs.

Agriculture

A fairly large proportion of the Berrien sandy loam is used for pasture and woodland. Where general farming is practised, only fair crops of wheat,

oats and hay are grown. However, yields should be greatly improved if satisfactory drainage and fertility conditions are provided. Fertility can be increased and maintained with the use of fertilizers high in phosphorus and potassium. Organic matter in the form of barnyard manure should be added, and clovers included in the rotation to build up the supply of nitrogen. In areas where a Podzol type of profile occurs the surface soil is usually acid and liming may be necessary. The chief limitations to successful crop production on the Berrien sandy loam are inadequate drainage and low fertility.

(c) Poorly Drained

Wauseon sandy loam (3,400 acres)

Wauseon sandy loam is the poorly drained member of the Bookton catena and exhibits the characteristics of the Dark Grey Gleisolic Great Soil Group.

The topography is level to depressional. The runoff is very low and the natural drainage is poor.

The natural vegetation consists mainly of elm and aspen. Trees such as soft maple, willow, white cedar and ash are also present.

The following is a generalized profile description.

A_0 — Thin layer of partially decomposed leaf litter.

A_1 — 0–9 inches very dark brown (10 YR 2/2) sandy loam; brown mottlings appear in the lower part of the horizon; fine granular structure; very friable consistency; pH 7.3.

G — 9–15 inches greyish brown (10 YR 5/2) sand; single grain structure; very friable consistency; pH 7.4.

C — 15–18 inches light yellow-brown (10 YR 6/4) sand; single grain structure; calcareous; very friable consistency; pH 7.6.

D — Grey (10 YR 5/1) clay till; yellow-brown mottlings; fragmental structure; plastic consistency when wet, hard when dry; calcareous; pH 8.2.

Occasionally the glei layer rests on the heavy textured clay till. The heavy clay till usually appears at a depth of three feet or less.

The cultivated surface layer is a black sandy loam approximately nine inches deep. The organic matter content is medium to high and, with the exception of nitrogen, the levels of available plant nutrients are low. The surface reaction is usually neutral.

Agriculture

The chief limitation of the type for the production of farm crops is poor natural drainage. This soil is used largely for permanent pasture and woodland. It is not well suited to the production of most farm crops, and poor drainage lessens its usefulness as pasture land because of the low quality grasses it supports. Areas that have been retired to permanent pasture are being invaded by willows and scrub tree growth. It is a late soil in the spring and often buckwheat is the only grain crop planted. Drainage improvement is difficult because of the problem of obtaining suitable outlets and the presence of the heavy textured clay till at moderately shallow depths.

C. SOILS DEVELOPED ON LACUSTRINE CLAY LOAM AND SILT LOAM

Lacustrine materials are deposited in deep, slowly moving or still water. In general, these soils occur in old lake beds or ponds and are fine textured. In Huron County the lacustrine soils have comparatively level topography, medium to high organic matter content, and are usually poorly drained. Occasionally varves are found in the lacustrine deposits. The chemical composition is usually similar to that of the till materials.

Only the poorly drained member of the Brantford catena, the Toledo series, occurs in Huron County. Toledo clay loam and Toledo silt loam were mapped in Stephen, Grey and Howick Townships.

(a) Poorly Drained

Toledo clay loam (3,200 acres)

Toledo soils are the poorly drained members of the Brantford catena and exhibit the characteristics of the Dark Grey Gleisolic Great Soil Group.

The runoff is very low and the permeability is very slow. The topography is level to undulating. The vegetation, in remaining woodlots, consists mainly of deciduous trees with species such as soft maple, elm, ash, aspen and basswood being most common.

The following is a generalized profile description of Toledo clay loam.

A_0 — Thin layer of partially decomposed leaf litter.

A_1 — 0–7 inches very dark grey-brown (10 YR 3/2) clay loam; fine granular structure; very friable consistency; stonefree; pH 7.3.

G — 7–18 inches grey-brown (10 YR 5/2) clay loam; medium nuciform structure; mottlings increase in intensity with depth; friable consistency; stonefree; pH 7.4.

C — Pale brown (10 YR 6/3) mottled clay; shells present; stonefree; plastic consistency when wet, hard when dry; pH 7.8.

Agriculture

These soils are suited for the production of such crops as alsike, timothy, oats, barley and buckwheat. If drainage is improved, a wider range of crops can be grown.

Although drainage increases the use capability of these soils, when they are intensively cropped and the organic matter content lowered, an unsatisfactory physical condition often occurs. Consequently it is necessary to maintain the organic matter content of the soil by frequent additions of barnyard manure and thereby prevent the deterioration of the soil's physical condition. Drainage is the main soil problem affecting the use and management of the Toledo soils.

Toledo silt loam (1,200 acres)

The profile characteristics of the Toledo silt loam are similar to those of the clay loam, the differentiating characteristic between the two types being one of textural difference of the surface soil. The use and management problems are similar to those discussed for the Toledo clay loam. When drained, the Toledo silt loam is well suited to the production of most crops commonly grown in Huron County.

D. SOILS DEVELOPED ON ALLUVIAL MATERIALS

Bottom Land (58,100 acres)

Bottom Land lies along stream courses and is subject to periodic flooding. Except in local areas along large rivers, this flood land is quite narrow and sometimes it is necessary to exaggerate the width of Bottom Land on the map in order to show the drainage pattern of the County. These soils are the most recently deposited and deposition may still take place during periodical flooding. The tree cover consists of elm, ash and willows. There is a lack of profile development. The profile is made up of successive layers of silt, sand and clay intermixed with layers of organic matter, and usually there is a gradual grading in colour from the surface down.

Agriculture

The soils are moist at all times and the abundant growth of grass provides good grazing land. The frequency and extent of flooding are important considerations when planning the use of this land, since good yields of general farm crops can be obtained in areas where flooding does not interfere with the growth of these crops. Broad extensive areas of flood land occur along the Maitland River that could be used to grow crops other than pasture. Since Bottom Land makes good pasture land, it appears to be serving a very useful purpose when utilized for the growing of this important crop.

A permanent sod cover provides an effective erosion control measure on the steep, dissected slopes occurring by the riverbanks.

E. ORGANIC SOILS

Organic deposits are formed mainly by the decomposition of grasses, sedges, and wood debris. Organic deposits occur in areas where the drainage is very slow or becomes impounded.

Muck (33,900 acres)

Muck soils occur in many locations in the county. Numerous small areas

are found in the Townships of Morris, Grey, Howick and Turnberry. Larger areas occur in West Wawanosh, McKillop, Stanley, Hay and Stephen Townships.

The topography is level to depressional and the drainage ranges from very poor to ponded. The tree vegetation consists mainly of elm, ash, white cedar, and a few spruce.

The profile of a muck soil usually does not exhibit the characteristic layering commonly found on a mineral soil. The following description indicates the arrangement of the layers.

$_1$ — Very dark grey or black (10 YR 2/1); well decomposed organic materials derived from sedges, leaves, and other readily decomposable material; exceeds twelve inches in depth; neutral in reaction.

$_2$ — The second layer contains more woody material and is less well decomposed.

$_3$ — This layer is usually black in colour, very sticky, and well decomposed.

$_4$ — At variable depths the organic materials may be underlain by clay, till or sand.

Agriculture

The muck soils are not used extensively for cultivated crops, and a large proportion of them remain under tree cover. However, they are well suited to intensive farming and to gardening when fertilizers are used to supplement the potash and phosphate deficiencies. Drainage must be improved before satisfactory crop yields can be obtained, and moisture must be then provided during the dry summer months by irrigation. The development of drainage and irrigation may prove costly. Areas which are particularly difficult to drain may be used as a source of organic matter to enrich the surrounding mineral soils.

PART IV

AGRICULTURE AND LAND USE

Early Settlement and Agricultural Development

The settlement of Huron County commenced in 1828 in the township of Goderich. Settlement started in the lakeshore and southern townships and proceeded northward until the last township, Turnberry, was entered in 1854.

According to the Report of the Ontario Agricultural Commission, 1881, mixed farming was most commonly carried on at that time. Fall wheat, barley and oats were the most popular crops grown, with yields averaging 20, 25, and 40 bushels per acre respectively. The farmers of that day recognized the need for fertility maintenance and drainage improvement for some soils. About thirty per cent of the farmers in the County used salt as a fertilizer, largely for grain and root crops. A considerable amount of underdraining was done, but hemlock, cedar and stones were generally employed instead of tile.

In 1881 the County had fifteen cheese factories, one creamery, several flour mills, a salt works, and agricultural implement factories. The cheese factories were located at Varna, Crediton, Brucefield, Seaforth, Bluevale, Belmore, Farquhar, and other locations. The salt wells at Goderich and Seaforth gave a considerable impetus to pork packing and lakeshore fishing. Large shipments of pork and fish were sent to distant markets.

Present Agriculture

Most of the land in Huron County is used for agricultural purposes. As indicated by the following table, over 90 per cent of the land area is used for cultivated crops, pasture and woodland.

TABLE 6

PRESENT LAND USE (1941 CENSUS)

(A)	Acres	Per Cent of Total
Total Land Area	828,800	100.0
Occupied Land	798,169	96.5
Improved Cleared Land	619,946	74.8
Unimproved Occupied Land	178,223	21.5
Including:		
Natural Pasture	98,169	
Wooded	66,357	
Marsh or Waste Land	13,697	
(B)		
No. of Farms	6,739	
Average Acres Per Farm	117	
Average Improved Cleared Land Per Farm	92	

As shown above, the average size of farm in Huron County is 117 acres. The average size of the wooded land per farm is approximately nine acres.

TABLE 7

ACREAGE AND DISTRIBUTION OF CROPS IN HURON COUNTY†

Pasture	178,700
Hay and Clover	103,900
Mixed Grains	81,200
Oats	50,300
Fall Wheat	41,900
Beans	22,256
Barley	21,300
Alfalfa	19,800
Flax	6,000
Turnips	3,750
Buckwheat	2,350
Potatoes	1,830
Soybeans	1,800
Peas	1,760
Mangels	1,360

† Annual Report of the Statistics Branch — Ontario Department of Agriculture 1945.

The above table indicates that most of the cultivated land is utilized for the growing of cereal grains, clovers, hay, and pasture. Specialized growing of canning crops occurs in the southern part of the County in the neighbourhood of the Towns of Exeter, Dashwood and Hensall.

The dairy industry is well developed in the southern part of the County. Fine herds of Holstein cattle are found in Stephen, Usborne, Hay, Tuckersmith, Stanley, Goderich, Colborne, Hullett, and McKillop Townships. This milk supply is either processed by creameries and cheese factories located within the County or is shipped as fluid milk to the urban centres of London and Toronto.

Mixed farming is the dominant agricultural occupation in the northern section of the County. The production of beef cattle, hogs, poultry and cereal grains provides the basis from which the farm income is derived.

The growing of flax is quite extensive in the district around the Town of Seaforth and in the Lucknow area.

The Use and Management of Huron County Soils

In an area such as Huron County, where agriculture is the most important industry, it naturally follows that the wise use and careful management of the soils is of tremendous significance. The soils of Huron County are widely different, varying in texture from sand to clay, in drainage from well to very poorly drained, and in topography from level to hilly. Some inherent characteristics of soils such as texture, topography, etc., cannot be modified and changed according to management. The objective of every landowner should be to develop and employ a system of management whereby he can use his land to the best possible advantage without depleting and lowering its productive capacity. For purposes of discussion, the soils of Huron County have been grouped on a textural basis (Fig. 11) and discussed according to drainage differences. Those salient features that are significant with reference to soil management are presented so that a better understanding of the soils of Huron County may be reached.

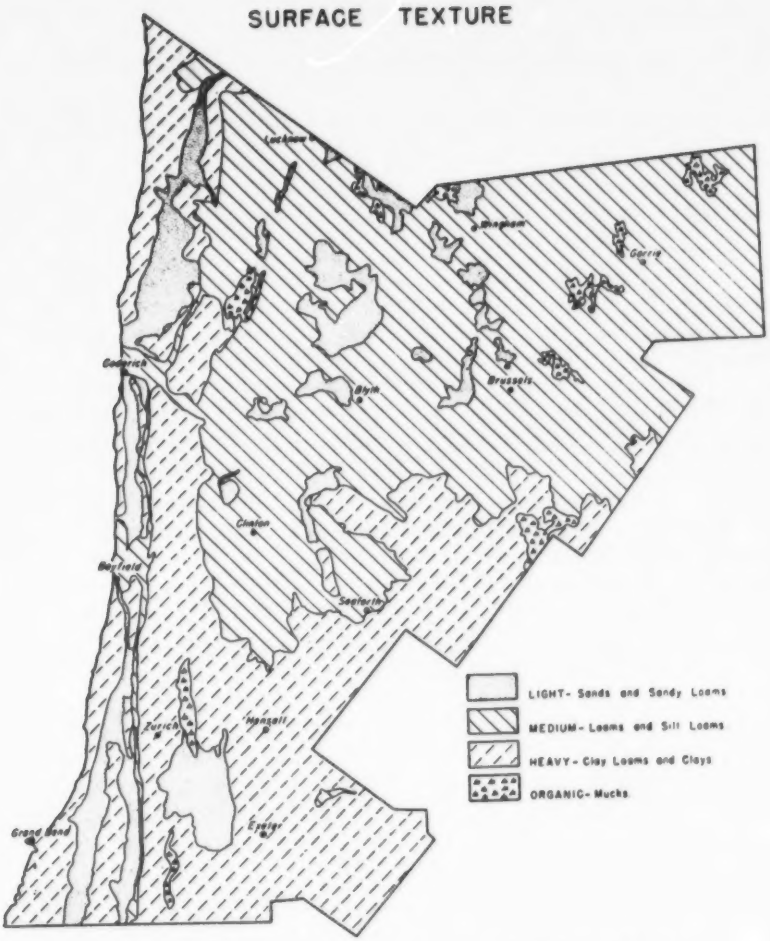


FIG. 11—Outline map of Huron County showing distribution of light, medium, and heavy textured soils.

1. CLAY AND SILT LOAM SOILS

(a) Well Drained

Soil Type	Acreage	% of Total
Huron clay loam	90,100	10.9
Huron silt loam	16,900	2.0
Total	107,000	12.9

For a comprehensive description of the Huron series the reader is referred to Part III of this report. By way of emphasis the susceptibility of the Huron soils to erosion is repeated. The degree to which erosion has affected these soils depends on past treatment, and on length and degree of slope. Where

short rotations have been practised and the soil left without cover during the fall and winter season, there has been a considerable loss of the valuable topsoil. Exposure of the soil to erosion during the summer season occurs where the soil is summer fallowed prior to the sowing of fall wheat. The significance of the loss of topsoil which contains the available plant nutrients and organic matter cannot be overemphasized. In a broad general way the most important principle in arresting sheet erosion is to keep a dense vegetative cover on the soils for as large a proportion of the time as possible. The maintenance of adequate organic matter and fertility levels is essential for an effective erosion control programme. The smooth regular slopes permit the application of such measures as contour tillage and strip cropping to control erosion. Some areas have suffered from gully erosion, particularly those close to the larger stream courses. Laboratory tests show the Huron soils to be relatively low in phosphorus, and fairly well supplied with calcium and potassium.

(b) Imperfectly Drained

Soil Type	Acreage	% of Total
Perth clay loam	113,500	13.8
Perth silty clay loam	500	.05
Perth silt loam	3,000	.4
Total	117,000	14.25

The use capability of these soils can be increased by artificial drainage which would permit the growth of a wider range of crops. The Perth soils are sometimes difficult to underdrain owing to the presence of depressional areas in the smooth gently sloping topography.

The soils are well suited to general farming, dairying, stock raising, and to certain types of specialization. Wheat, alfalfa, clover, spring grains and alsike do well under most conditions, and canning crops such as peas, beans and corn can be successfully grown. When row crops are planted on these soils organic matter maintenance becomes very important since little of the crop residue is returned to the soil. For best rotations forage crops, particularly legumes, should be included along with cereal grains and row crops. To provide a satisfactory physical condition in the soil adequate organic matter levels must be maintained through the use of barnyard manure and green manuring crops. Careful attention should be given to methods of handling manure so that there will be as little loss as possible.

(c) Poorly Drained

Soil Type	Acreage	% of Total
Brookston clay loam	64,700	7.9
Brookston silty clay loam	12,000	1.4
Brookston silt loam	1,100	.1
Toledo clay loam	3,200	.4
Toledo silt loam	1,200	.2
Total	83,200	11.0

The Brookston soils contain more grit and stones than the Toledo soils. However, the Toledo usually has a slightly higher organic matter content.

Artificial drainage greatly increases the use capability of these soils, allowing a wider range of crops to be grown. Soils can be drained by either open or closed systems. Although open ditches are able to carry a large amount of water they are wasteful of land and encourage erosion and weed growth. Tile drains are most effective under many conditions, because little maintenance work is required.

These soils are suited to general farming and stock raising. When drained, certain types of specialization are possible, such as cash cropping, particularly where climate permits. Brookston and Toledo inherently have a fairly high natural fertility. When used for the growing of crops, care must be exercised to maintain adequate organic matter and fertility levels. Once the organic matter becomes depleted an undesirable physical condition results which makes the tile underdraining less effective. If adequate drainage is provided and fertility levels are maintained, good yields of most farm crops are obtained on these soils.

Cleaning a ditch draining the Brookston clay loam.

2. LOAM AND SILT LOAM SOILS

(a) Well Drained

Soil Type	Acreage	% of Total
Burford loam	30,900	3.7
Dumfries loam	10,200	1.2
Harriston loam	167,900	20.2
Harriston silt loam	26,400	3.2
Teeswater silt loam	26,900	3.2
Total	213,300	31.5

Approximately one-third of the soils of Huron County have loam or silt loam textures and are well drained. Within this group, however, there is a wide range in topography. The Burford and Teeswater series occur in association with stream courses and have relatively smooth to slightly undulating topography. The underlying gravelly materials allow the soil moisture to move freely with the result that spring cultivation is usually started earlier on these soils than any other of the group. They are well suited to the growing of most farm crops, and the level topography permits the growing of row crops with a minimum loss through erosion. Provided adequate organic and nutrient levels are maintained, the Burford and Teeswater soils will produce good yields of general farm crops.

The Harriston series occupies over 23% of the soils of Huron County. These soils are well suited to the growing of cereal grains, corn, alfalfa, hay and clovers. The smooth gently sloping to smooth steeply sloping topography results in high run-off and, unless adequate erosion control measures are applied, sheet erosion becomes a hazard of considerable magnitude. The simple slopes are adapted to erosion control measures such as contour cultivation and strip cropping. The underlying till materials are sufficiently porous to permit good internal drainage. Maintenance of adequate organic matter and fertility levels is of prime importance for successful crop production.

Only a relatively small acreage of Dumfries loam occurs in Huron County. The complex slopes ranging from irregular moderately sloping to irregular very steeply sloping result in a high proportion of run-off and sheet erosion. Other than through the use of long rotations it is difficult to control erosion on the Dumfries soils since the slopes are poorly suited to contour cultivation and strip cropping practices. Often stones occur in sufficiently large numbers to interfere seriously with cultivation. Because of the serious erosion hazard the Dumfries soils should be kept under a vegetative cover for as large a proportion of the time as possible.

(b) Imperfectly Drained

Soil Type	Acreage	% of Total
Brisbane loam	1,200	.2
Guerin loam	100	.01
Listowel loam	35,500	4.2
Listowel silt loam	13,600	1.6
Total	50,400	6.01

Slightly over 6% of the loam and silt loam textured soils of Huron County are imperfectly drained. Unsatisfactory moisture relations limit the range of crops that can be grown on these soils.

Effective, systematic drainage systems can be installed which greatly increase reliability and usability of the imperfectly drained soils. The Listowel loam and silt loam occur in broad extensive expanses while Brisbane loam and Guerin loam are usually found in small areas in association with the better drained Fox and Burford soils. Chemical tests show that these soils are moderately well supplied with organic matter, calcium and potassium, while the phosphorus content is low.

(c) Poorly Drained

Soil Type	Acreage	% of Total
Gilford loam	3,500	.4
Lyons loam	500	.05
Parkhill loam	13,800	1.6
Parkhill silt loam	6,400	.7
Total	24,200	2.75

Usually the poorly drained loam and silt loam soils do not occur as large expanses but are found in small areas in association with the imperfectly and well drained soils. Poor drainage is the chief limiting factor associated with the use of these soils. Nearly level to depressional topography reduces surface drainage to a minimum and often causes water to lie on these soils late in the spring, thus delaying cultivation beyond the time when crops can be planted. The soils contained in this group are used extensively for pasture land. Most of Huron County has been cleared of its forest cover but woodlots are fairly common on the poorly drained soils.

Once the drainage is improved, fair yields of general farm crops are obtained. In the undrained condition these soils are moderately well supplied with organic matter and plant nutrients. With drainage improvement, care must be exercised to guard against organic matter depletion.

3. SANDY LOAM SOILS

(a) Well Drained

Soil Type	Acreage	% of Total
Bookton sandy loam	3,100	.3
Donnybrook sandy loam	32,400	3.9
Dumfries sandy loam	1,400	.17
Fox sandy loam	500	.05
Total	37,400	4.42

Slightly over 4 per cent of the soils of Huron County are sandy loam in texture. Because of the coarse texture, moisture percolates through the soil materials readily resulting in a well drained condition. The good drainage permits cultivation early in the season. The soils contained in this group are low in plant nutrients. Inherently the organic matter content is low and, to obtain satisfactory yields, applications of fertilizer and manure are necessary.

The Bookton sandy loam and the Fox sandy loam occur on smooth gently sloping topography. Clay occurs at depths of three feet and less in the Bookton sandy loam which increases its capability for growing crops. The underlying clay is better supplied with plant nutrients than the coarse textured overburden. Only a very small acreage of Fox sandy loam occurs in Huron County and its chief limitation is one of low fertility. The Bookton and Fox soils are used for growing general farm crops. A large proportion of the Bookton and practically all the Fox mapped in the County occur adjacent to the Lake Huron shore where the climatic environment is satisfactory for the growing of tree fruits and vegetable crops.

The topography of the Donnybrook sandy loam and the Dumfries sandy loam ranges from irregular moderately sloping to irregular steeply sloping. Both soils are susceptible to erosion and the irregular slopes make the application of strip cropping and contour cultivation practices very difficult. To guard against sheet erosion these soils should be kept under cover for as large a proportion of time as possible. Stones may occur in sufficiently large numbers to interfere with cultivation unless removed.

(b) Imperfectly Drained

Soil Type	Acreage	% of Total
Brady sandy loam	7,000	.8
Berrien sandy loam	37,800	4.6
Total	44,800	5.4

Imperfect drainage limits the range of crops that can be grown on these sandy loam soils. Water is seldom seen on the surface of the Brady sandy loam and Berrien sandy loam, but water percolation is slowed by the presence of either a high water table or an impermeable layer. Tile drains are easily installed in the Brady sandy loam, but the presence of a clay layer at depths of three feet and less make the installation of drains difficult in the Berrien sandy loam.

A large part of the imperfectly drained sandy soils occur near the Lake Huron shore where the moderating effect of the large body of water on the climate permits the growth of high value crops such as vegetables and tree fruits. A wide range of crops can be grown on these soils when drained, and when the low phosphorus, potassium and nitrogen contents are increased and maintained through the use of suitable fertilizers.

(c) Poorly Drained

Soil Type	Acreage	% of Total
Granby sandy loam	7,200	.8
Wauseon sandy loam	3,400	.4
Total	10,600	1.2

The poorly drained sandy loam soils usually occur as small areas in association with the imperfectly and well drained soils. In most areas cultivation has been abandoned because of poor drainage and the soils are now covered by pasture or tree vegetation consisting mainly of aspen, willow and birch. Drainage of these soils is difficult because of the presence of a high water table. The presence of a clay layer at depths of three feet and less in the Wauseon sandy loam also contributes to the difficulty of installing tile drains in this soil.

Once drainage is improved, only fair yields of general farm crops are obtained. These soils are high in nitrogen and usually low in phosphorus and potassium. The high nitrogen content, in comparison with the low phosphorus and potassium, will cause lodging of cereal crops. The addition of fertilizers high in phosphorus and potassium is recommended to increase the quantity and quality of the grains.

Adaptability of Soils for Crops Commonly Grown in Huron County

Successful crop production within any area depends upon the presence of a satisfactory soil climatic relationship. Provided the climate is satisfactory the adaptability of a soil to produce a crop is strongly influenced by its chemical and physical characteristics. If the climate and soil remain the same, differences in yields may be explained in terms of varying management practices.

In Part III of this report the potentialities and limitations for crop production of the soil types have been discussed. Now consideration is given to the soil type — crop relationship with particular reference to the comparative suitability of individual soil types for specific crops commonly grown in the area. A rating is given to show the adaptability of different soils to produce a wide range of crops.

Various methods have been used for making soil ratings. In this particular rating the characteristics of the soil are weighed in relation to their effect upon the production of a particular crop. Purely scientific ratings are rather difficult to obtain due to the many factors that influence crop production on the various soil types. If crop yields could be collected under specific management from sample areas well distributed over a soil type area, and for a sufficient number of years to eliminate differences due to climatic variations, crop ratings would probably be quite accurate. However, such a collection of data would be costly and time consuming.

Although yield figures are not given for individual soil types, the following table shows comparative rating of different soils in Huron County according to their adaptability to grow crops commonly grown in the area. The basis upon which the ratings are formed depends on the judgment of the individuals making the rating. The ratings are made for crops grown under prevailing systems of management. Should new varieties be introduced or farm management practices changed, the ratings may of necessity be adjusted.

TABLE 8

GOOD CROPLAND

Soil Type	Acreage	% of Total
Teeswater silt loam	26,900	3.2
Harriston silt loam	26,400	3.2
Harriston loam	167,900	20.2
Huron silt loam	16,900	2.0
Huron clay loam	90,100	10.9
Total	328,200	39.5

With management practices that provide an adequate organic matter content and maintain satisfactory nutrient levels, the soils contained in this group will produce medium to high yields of general farm crops. When these soils are used for growing specialized crops, such as turnips and tree fruits, special fertility practices are required. Due to heavy texture, Huron clay loam requires careful management in order that a satisfactory physical condition may be established and loss from erosion controlled.

TABLE 9

CROP ADAPTABILITY RATINGS FOR GOOD CROPLAND (1)

Soil Type	Wheat		Oats		Barley		Alfalfa		Red Clover		Alsike		Timothy		Corn		Peas and Beans		Tree Fruits		Turnips		Pasture	
	(2) N.D.	(3) T.D.	N.D.	T.D.	N.D.	T.D.	N.D.	T.D.	N.D.	T.D.	N.D.	T.D.	N.D.	T.D.	N.D.	T.D.	N.D.	T.D.	N.D.	T.D.	N.D.	T.D.	N.D.	T.D.
Teeswater silt loam	G	.....	G	.....	G	.....	G	.....	G	.....	G	.....	G	.....	G	.....	G	.....	G-F	.....	G	.....	G	.....
Harriston silt loam	G	.....	G	.....	G	.....	G	.....	G	.....	G	.....	G	.....	G-F	.....	G-F	.....	G-F	.....	G-F	.....	G	.....
Harriston loam	G	.....	G	.....	G	.....	G	.....	G	.....	G	.....	G	.....	G-F	.....	G-F	.....	G-F	.....	G-F	.....	G	.....
Huron silt loam	G	.....	G	.....	G	.....	G	.....	G	.....	G	.....	G	.....	G-F	.....	G-F	.....	F	.....	G-F	.....	G	.....
Huron clay loam	G	.....	G	.....	G	.....	G	.....	G	.....	G	.....	G	.....	G-F	.....	G-F	.....	F	.....	G-F	.....	G	.....

(1) The crop adaptability rating for each soil as follows:
G — Good; G-F — Good to Fair; F — Fair; F-P — Fair to Poor; P — Poor.
(2) N.D. — Natural Drainage.
(3) T.D. — Tile Drainage.

TABLE 11

CROP ADAPTABILITY RATINGS FOR GOOD TO FAIR CROPLAND (1)

Soil Type	Wheat		Oats		Barley		Alfalfa		Red Clover		Alsike		Timothy		Corn		Peas and Beans		Tree Fruits		Turnips		Pasture	
	(2) N.D.	(3) T.D.	N.D.	T.D.	N.D.	T.D.	N.D.	T.D.	N.D.	T.D.	N.D.	T.D.	N.D.	T.D.	N.D.	T.D.	N.D.	T.D.	N.D.	T.D.	N.D.	T.D.	N.D.	T.D.
Listowel loam	F	G-F	G-F	G	F	G	F	G-F	G-F	G	G	G	G	G	G-F	G	G-F	G	F	G-F	F	G-F	G	G
Listowel silt loam	F	G-F	G-F	G	F	G	F	G-F	G-F	G	G	G	G	G	G-F	G	G-F	G	F	G-F	F	G-F	G	G
Perth silt loam	F	G-F	G-F	G	F	G	F	G-F	G-F	G	G	G	G	G	F	G-F	F	G-F	F-P	F	F	G-F	G	G
Perth silty clay loam	F	G-F	G-F	G	F	G	F	G-F	G-F	G	G	G	G	G	F	G-F	F	G-F	F-P	F	F	G-F	G	G
Perth clay loam	F	G-F	G-F	G	F	G	F	G-F	G-F	G	G	G	G	G	F	G-F	F	G-F	F-P	F	F	G-F	G	G
Burford loam	G-F	.....	G-F	.....	G-F	.....	F	.....	F	.....	F	.....	F	.....	G-F	.....	G-F	.....	G-F	.....	G-F	.....	G-F	.....
Brookston clay loam	P	G-F	F	G	F	G	P	F	F	G-F	F	G	F	G	F-P	G-F	F-P	G-F	P	F-P	F-P	F	G-F	G
Brookston silty clay loam	P	G-F	F	G	F	G	P	F	F	G-F	F	G	F	G	F-P	C-F	F-P	C-F	P	F-P	F-P	F	G-F	G
Brookston silt loam	P	G-F	F	G	F	G	P	F	F	G-F	F	G	F	G	F-P	C-F	F-P	G-F	P	F-P	F-P	F	G-F	G
Toledo clay loam	P	G-F	F	G	F	G	P	F	F	G-F	F	G	F	G	F-P	C-F	F-P	G-F	P	F-P	F-P	F	G-F	G
Toledo silt loam	P	G-F	F	G	F	G	P	F	F	G-F	F	G	F	G	F-P	G-F	F-P	G-F	P	F-P	F-P	F	G-F	G

(1) The crop adaptibility rating for each crop as follows:
G — Good; G-F — Good to Fair; F — Fair; F-P — Fair to Poor; P — Poor.
(2) N.D. — Natural Drainage.
(3) T.D. — Tile Drainage.

These soils are fairly well supplied with nutrients with the exception of phosphorus which is usually low to very low. The organic matter content is medium.

TABLE 10

GOOD TO FAIR CROPLAND

Soil Type	Acreage	% of Total	Limitations
Listowel loam	35,500	4.2	Drainage
Listowel silt loam	13,600	1.6	Drainage
Perth silt loam	3,000	.4	Drainage
Perth silty clay loam	500	.05	Drainage
Perth clay loam	113,500	13.8	Drainage
Burford loam	30,900	3.7	Fertility
Brookston clay loam	65,700	7.9	Drainage
Brookston silty clay loam	12,000	1.4	Drainage
Brookston silt loam	1,100	.1	Drainage
Toledo clay loam	3,200	.4	Drainage
Toledo silt loam	1,200	.2	Drainage
Total	280,200	33.75	

The soils contained in Good to Fair Cropland are moderately well suited to the production of general farm crops. The Perth and Listowel soils are used extensively for dairy farming purposes. However, in the Exeter area a large proportion of the Perth soils are used for growing canning crops.

The greatest limitation to crop production on the Perth and Listowel soils is inadequate drainage. Drainage improvement may be rather difficult due to depressional areas that occur. However, once the moisture relationships are improved, the Perth and Listowel types grow a wider range of crops and are more reliable. Good soil management practices must maintain adequate organic matter and plant nutrient levels through the use of barnyard manure and commercial fertilizer.

Burford loam is well suited to the growing of certain specialized crops such as tree fruits, raspberries, vegetables, etc. The greatest limitation to crop production is one of low fertility. Fertilizer and manure should be added to the soil to maintain a satisfactory condition of soil fertility. In some locations stones may interfere with cultivation. The porous nature of Burford loam makes early cultivation possible.

The Brookston and Toledo series are poorly drained and produce only fair yields of most crops unless underdrained. The installation of tile drains increases the use capability of these soils, allowing a wider range of crops to be grown. However, improved drainage conditions often lead to poor physical conditions particularly where these soils are heavily cropped. To conserve the drained Brookston and Toledo soils, fertility levels must be maintained with particular emphasis placed on the importance of an adequate organic matter content.

TABLE 12

FAIR CROPLAND

Soil Type	Acreage	% of Total	Limitations
Bookton sandy loam	3,100	.3	Fertility & Erosion
Fox sandy loam	500	.05	Fertility
Dumfries loam	10,200	1.2	Fertility & Erosion
Parkhill silt loam	6,400	.7	Drainage
Parkhill loam	13,800	1.6	Drainage
Total	34,000	3.85	

TABLE 13

CROP ADAPTABILITY RATINGS FOR FAIR CROPLAND (1)

Soil Type	Wheat		Oats		Barley		Alfalfa		Red Clover		Alsike		Timothy		Corn		Peas and Beans		Tree Fruits		Turnips		Pasture	
	(2) N.D.	(3) T.D.	N.D.	T.D.	N.D.	T.D.	N.D.	T.D.	N.D.	T.D.	N.D.	T.D.	N.D.	T.D.	N.D.	T.D.	N.D.	T.D.	N.D.	T.D.	N.D.	T.D.	N.D.	T.D.
Bookton sandy loam	F	.....	F	.....	F-P	.....	F	.....	F	.....	G-F	.....	F	.....	F	.....	F	.....	F	.....	F	.....	F	.....
Fox sandy loam	F	.....	F	.....	F	.....	F-P	.....	F	.....	G-F	.....	F	.....	F-P	.....	F	.....	G-F	.....	F	.....	F	.....
Dumfries loam	F	.....	F	.....	F-P	.....	F	.....	F	.....	G-F	.....	F	.....	F-P	.....	F-P	.....	F	.....	F	.....	F	.....
Parkhill silt loam	P	F-P	F-P	F	P	F-P	P	F-P	P	F	F	G-F	F	G-F	P	F	P	F	P	P	P	F	F	G-F
Parkhill loam	P	F-P	F-P	F	P	F-P	P	F-P	P	F	F	G-F	F	G-F	P	F	P	F	P	P	P	F	F	G-F

(1) The crop adaptability rating of each soil as follows:
G — Good; G-F — Good to Fair; F — Fair; F-P — Fair to Poor; P — Poor.

(2) N.D. — Natural Drainage.

(3) T.D. — Tile Drainage.

TABLE 15

CROP ADAPTABILITY RATINGS FOR FAIR TO POOR CROPLAND (1)

Soil Type	Wheat		Oats		Barley		Alfalfa		Red Clover		Alsike		Timothy		Corn		Peas and Beans		Tree Fruits		Turnips		Pasture	
	(2) N.D.	(3) T.D.	N.D.	T.D.	N.D.	T.D.	N.D.	T.D.	N.D.	T.D.	N.D.	T.D.	N.D.	T.D.	N.D.	T.D.	N.D.	T.D.	N.D.	T.D.	N.D.	T.D.	N.D.	T.D.
Dumfries sandy loam	F-P	.....	F-P	.....	P	.....	F	.....	F	.....	F	.....	F	.....	P	.....	P	.....	F-P	.....	P	.....	F	.....
Donnybrook sandy loam	F-P	.....	F-P	.....	P	.....	F	.....	F	.....	F	.....	F-P	.....	P	.....	P	.....	F-P	.....	P	.....	F	.....
Guerin loam	P	F-P	F-P	F	P	F-P	P	P	P	F	F	G-F	P	F	P	F	P	F	P	F-P	F	F	F	F
Brisbane loam	P	F-P	F-P	F	P	F-P	P	P	P	F	F	G-F	P	F	P	F	P	F	P	F-P	P	F	F	F
Brady sandy loam	P	F-P	F-P	F	P	P	P	P	P	F-P	F-P	F-P	P	F-P	P	F	P	F	P	F	P	F	F-P	F-P
Berrien sandy loam	P	F-P	F-P	F-P	P	P	P	F-P	P	F-P	F-P	F	P	F	P	F-P	P	F-P	P	F-P	P	F-P	F-P	F

(1) The crop adaptability soil rating for each crop as follows:
G — Good; G-F — Good to Fair; F — Fair; F-P — Fair to Poor; P — Poor.

(2) N.D. — Natural Drainage.

(3) T.D. — Tile Drainage.

The adaptability of the Fair Cropland soils to produce general farm crops is limited by one or more of the following factors: (1) unsatisfactory drainage, (2) low fertility, and (3) susceptibility to erosion.

The use capability of the Fox, Bookton and Dumfries series is limited by low fertility. Cereal grains do fairly well on these soils and satisfactory crops of hay and pasture are produced. Applications of fertilizers and manure are essential to provide adequate plant nutrient levels for successful crop production. Crop production on Dumfries loam and Bookton sandy loam is limited by susceptibility to erosion as well as low fertility.

The use capability of the Parkhill series is limited by poor drainage. Small, depressional areas may be hard to drain because of the difficulty in providing an outlet. However, the larger level areas can be successfully drained, allowing the growth of a wider range of crops.

TABLE 14

FAIR TO POOR CROPLAND

Soil Type	Acreage	% of Total	Limitations
Dumfries sandy loam	1,400	.2	Fertility & Erosion
Donnybrook sandy loam	32,400	3.9	Fertility & Erosion
Guerin loam	100	.01	Drainage & Fertility
Brisbane loam	1,200	.2	Drainage & Fertility
Brady sandy loam	7,000	.8	Fertility & Drainage
Berrien sandy loam	37,800	4.6	Drainage & Fertility
Total	79,900	9.71	

The soils in the Fair to Poor Cropland group are moderately to poorly suited to the production of general farm crops. Dumfries sandy loam and Donnybrook sandy loam are best suited to the production of hay and pasture crops, although fair yields of other crops are produced if the erosion hazard is not too great. In order to produce a good cover to control erosion, applications of fertilizer and manure are required and special emphasis is placed on the usefulness of long rotations to reduce the danger to a minimum.

Crop production on the Guerin loam, Brisbane loam, Brady sandy loam and Berrien sandy loam is limited by low fertility and unsatisfactory drainage. These soils are best suited for hay and pasture crops. However, fair yields of vegetables and tree fruits are obtained on Berrien sandy loam where drainage is improved and adequate fertility levels established.

TABLE 16

POOR CROPLAND

Soil Type	Acreage	% of Total	Limitations
Gilford loam	3,500	.4	Drainage & Fertility
Lyons loam	500	.05	Drainage & Fertility
Wauseon sandy loam	3,400	.4	Drainage & Fertility
Granby sandy loam	7,200	.8	Drainage & Fertility
Total	14,600	1.65	

TABLE 17

CROP ADAPTABILITY RATINGS FOR POOR CROPLAND (1)

Soil Type	Wheat		Oats		Barley		Alfalfa		Red Clover		Alsike		Timothy		Corn		Peas and Beans		Tree Fruits		Turnips		Pasture	
	(2) N.D.	(3) T.D.	N.D.	T.D.	N.D.	T.D.	N.D.	T.D.	N.D.	T.D.	N.D.	T.D.	N.D.	T.D.	N.D.	T.D.	N.D.	T.D.	N.D.	T.D.	N.D.	T.D.	N.D.	T.D.
Gilford loam	P	F-P	P	F-P	P	F-P	P	P	P	F-P	P	F	P	F-P	P	P	P	F-P	P	P	P	F-P	F-P	F-P
Lyons loam	P	F-P	P	F-P	P	F-P	P	P	P	F-P	P	F	P	F-P	P	P	P	F-P	P	P	P	F-P	F-P	F-P
Wauseon sandy loam	P	F-P	P	F-P	P	F-P	P	P	P	F-P	P	F	P	F-P	P	F-P	P	F-P	P	P	P	F-P	P	F-P
Granby sandy loam	P	F-P	P	F-P	P	F-P	P	P	P	F-P	P	F	P	F-P	P	P	P	F-P	P	P	P	P	P	F-P

(1) The crop adaptability rating for each soil type as follows:

G — Good; G-F — Good to Fair; F — Fair; F-P — Fair to Poor; P — Poor.

(2) N.D. — Natural Drainage.

(3) T.D. — Tile Drainage.

TABLE 19

CROP ADAPTABILITY RATINGS FOR SUBMARGINAL CROPLAND (1)

Soil Type	Wheat		Oats		Barley		Alfalfa		Red Clover		Alsike		Timothy		Corn		Peas and Beans		Tree Fruits		Turnips		Pasture	
	(2) N.D.	(3) T.D.	N.D.	T.D.	N.D.	T.D.	N.D.	T.D.	N.D.	T.D.	N.D.	T.D.	N.D.	T.D.	N.D.	T.D.	N.D.	T.D.	N.D.	T.D.	N.D.	T.D.	N.D.	T.D.
Bottom Land	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	G	G
Muck	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P

(1) The crop adaptability rating for each soil type as follows:

G — Good; G-F — Good to Fair; F — Fair; F-P — Fair to Poor; P — Poor.

(2) N.D. — Natural Drainage.

(3) T.D. — Tile Drainage.

Less than 2 per cent of the soils of Huron County are considered Poor Cropland. The greatest limitation to successful crop production on the Gilford loam, Lyons loam, Wauseon sandy loam, and Granby sandy loam is poor drainage. In most instances areas of these soils are small and depressional, making the use of tile drains impractical. In localities where tile drains can be installed, fertilizer and manure applications are necessary to build and maintain adequate fertility and organic matter levels.

TABLE 18

SUBMARGINAL CROPLAND

Soil Type	Acreage	% of Total	Limitations
Bottom Land	58,100	7.0	Susceptibility to periodic flooding.
Muck	33,900	4.1	Very poor drainage.
Total	92,000	11.1	

The Bottom Land of Huron County is that land lying along the stream courses which is flooded for part of the year. Because of this hazard it is best used as grazing land. If the periodic flooding could be controlled, the Bottom Land would be capable of producing good yields of most farm crops.

Under present land use most of the Muck in the County is in woodland. The muck consists of well decomposed organic material over marl or clay and is very poorly drained. Drainage improvement is expensive and difficult and, unless there is urgent need for the agricultural development of organic soils, it is possibly serving its most useful purpose in its present state.

The crop adaptability ratings for all the soil types of Huron County are shown in Table 20.

Soil Problems and Land Use

The soil survey of Huron County indicated that certain hazards or problems are more prominent in one area than in another. The main problems that occur in the County may be attributed to the effect of one or a combination of such factors as susceptibility to erosion, inadequate drainage and lack of fertility. The extent and distribution of the problem areas is shown in Fig. 14. There are areas in Huron County where, provided good soil management practices are employed, the soils can be used without any serious problems developing.

Erosion

Loss of valuable topsoil through erosion is closely related to topography and texture of the soil. Areas of severe, moderate, slight, and little or no erosion are indicated in Fig. 12. Where erosion is severe, hilly topography causes rapid runoff of water contributing to the loss of large amounts of soil. Smooth moderate slopes and loam to clay loam texture are susceptible to erosive forces. Slight erosion occurs where the topography is gently sloping and areas with level to depressional topography have little or no erosion problem.

TABLE 20

CROP ADAPTABILITY RATINGS FOR HURON COUNTY (1)

Soil Type	Wheat		Oats		Barley		Alfalfa		Red Clover		Alsike		Timothy		Corn		Peas and Beans		Tree Fruits		Turnips		Pasture	
	(2) N.D.	(3) T.D.	N.D.	T.D.	N.D.	T.D.	N.D.	T.D.	N.D.	T.D.	N.D.	T.D.	N.D.	T.D.	N.D.	T.D.	N.D.	T.D.	N.D.	T.D.	N.D.	T.D.	N.D.	T.D.
Good Cropland																								
Teeswater silt loam	G		G		G		G		G		G		G		G		G		G–F		G		G	
Harriston silt loam	G		G		G		G		G		G		G		G–F		G–F		G–F		G–F		G	
Harriston loam	G		G		G		G		G		G		G		G–F		G–F		G–F		G–F		G	
Huron silt loam	G		G		G		G		G		G		G		G–F		G–F		F		G–F		G	
Huron clay loam	G		G		G		G		G		G		G		G–F		G–F		F		G–F		G	
Good to Fair Cropland																								
Listowel loam	F	G–F	G–F	G	F	G	F	G–F	G–F	G	G	G	G	G	G–F	G	G–F	G	F	G–F	F	G–F	G	G
Listowel silt loam	F	G–F	G–F	G	F	G	F	G–F	G–F	G	G	G	G	G	G–F	G	G–F	G	F	G–F	F	C–F	G	G
Perth silt loam	F	G–F	G–F	G	F	G	F	G–F	G–F	G	G	G	G	G	F	G–F	F	G–F	F–P	F	F	C–F	G	G
Perth silty clay loam	F	G–F	G–F	G	F	G	F	G–F	G–F	G	G	G	G	G	F	G–F	F	G–F	F–P	F	F	C–F	G	G
Perth clay loam	F	G–F	C–F	G	F	G	F	G–F	C–F	G	G	G	G	G	F	G–F	F	G–F	F–P	F	F	G–F	G	G
Burford loam	G–F		G–F		G–F		F		F		F		F		G–F		G–F		G–F		G–F		G–F	
Brookston clay loam	P	G–F	F	G	F	G	P	F	F	G–F	F	G	F	G	F–P	G–F	F–P	G–F	P	F–P	F–P	F	G–F	G
Brookston silty clay loam	P	G–F	F	G	F	G	P	F	F	G–F	F	G	F	G	F–P	G–F	F–P	G–F	P	F–P	F–P	F	G–F	G
Brookston silt loam	P	G–F	F	G	F	G	P	F	F	G–F	F	G	F	G	F–P	G–F	F–P	G–F	P	F–P	F–P	F	G–F	G
Toledo clay loam	P	G–F	F	G	F	G	P	F	F	G–F	F	G	F	G	F–P	G–F	F–P	G–F	P	F–P	F–P	F	G–F	G
Toledo silt loam	P	G–F	F	G	F	G	P	F	F	G–F	F	G	F	G	F–P	G–F	F–P	G–F	P	F–P	F–P	F	G–F	G

TABLE 20 (*Cont'd*)

CROP ADAPTABILITY RATINGS FOR HURON COUNTY

Soil Type	Wheat		Oats		Barley		Alfalfa		Red Clover		Alsike		Timothy		Corn		Peas and Beans		Tree Fruits		Turnips		Pasture	
	(2) N.D.	(3) T.D.	N.D.	T.D.	N.D.	T.D.	N.D.	T.D.	N.D.	T.D.	N.D.	T.D.	N.D.	T.D.	N.D.	T.D.	N.D.	T.D.	N.D.	T.D.	N.D.	T.D.	N.D.	T.D.
Fair Cropland																								
Bookton sandy loam	F	.....	F	.....	F–P	.....	F	.....	F	.....	G–F	.....	F	.....	F	.....	F	.....	F	.....	F	.....	F	.....
Fox sandy loam	F	.....	F	.....	F	.....	F–P	.....	F	.....	G–F	.....	F	.....	F–P	.....	F	.....	G–F	.....	F	.....	F	.....
Dumfries loam	F	.....	F	.....	F–P	.....	F	.....	F	.....	G–F	.....	F	.....	F–P	.....	F	.....	F	.....	F	.....	F	.....
Parkhill silt loam	P	F–P	F–P	F	P	F–P	P	F–P	P	F	F	G–F	F	G–F	P	F	P	F	P	P	P	F	F	G–F
Parkhill loam	P	F–P	F–P	F	P	F–P	P	F–P	P	F	F	G–F	F	G–F	P	F	P	F	P	P	P	F	F	G–F
Fair to Poor Cropland																								
Dumfries sandy loam	F–P	.....	F–P	.....	P	.....	F	.....	F	.....	F	.....	F	.....	P	.....	P	.....	F–P	.....	P	.....	F	.....
Donnybrook sandy loam	F–P	.....	F–P	.....	P	.....	F	.....	F	.....	F	.....	F–P	.....	P	.....	P	.....	F–P	.....	P	.....	F	.....
Guerin loam	P	F–P	F–P	F	P	F–P	P	P	P	F	F	G–F	P	F	P	F	P	F	P	F–P	P	F	F	F
Brisbane loam	P	F–P	F–P	F	P	F–P	P	P	P	F	F	G–F	P	F	P	F	P	F	P	F–P	P	F	F	F
Brady sandy loam	P	F–P	F–P	F	P	P	P	P	P	F–P	F–P	F–P	P	F–P	P	F	P	F	P	F	P	F	F–P	F–P
Berrien sandy loam	P	P	F–P	F–P	P	P	P	F–P	P	F–P	F–P	F	P	F	P	F–P	P	F–P	P	F–P	P	F–P	F–P	F
Poor Cropland																								
Gilford	P	F–P	P	F–P	P	F–P	P	P	P	F–P	P	F	P	F–P	P	P	P	F–P	P	P	P	F–P	F–P	F–P
Lyons loam	P	F–P	P	F–P	P	F–P	P	P	P	F–P	P	F	P	F–P	P	P	P	F–P	P	P	P	F–P	F–P	F–P
Wauseon sandy loam	P	F–P	P	F–P	P	F–P	P	P	P	F–P	P	F	P	F–P	P	F–P	P	F–P	P	P	P	F–P	P	F–P
Cranby sandy loam	P	F–P	P	F–P	P	F–P	P	P	P	F–P	P	F	P	F–P	P	P	P	F–P	P	P	P	P	P	F–P
Submarginal Cropland																								
Bottom Land	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	G	.....
Muck	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P

(1) The crop adaptability rating for each soil type as follows:
G — Good; G–F — Good to Fair; F — Fair; F–P — Fair to Poor: P — Poor.

(2) N.D. — Natural Drainage.

(3) T.D. — Tile Drainage.

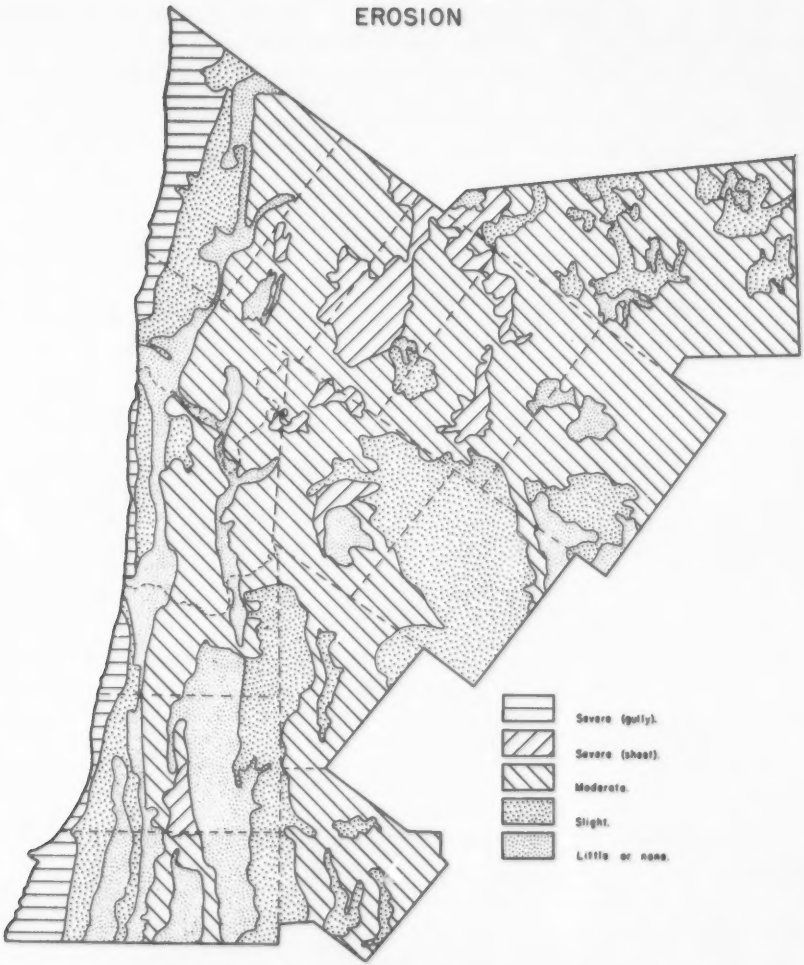


FIG. 12—Outline map of Huron County showing the distribution of erosion classes.

TABLE 21

EROSION OF HURON COUNTY SOILS

Erosion Group	Acreage	% of Total
Severe (gully)	57,200	6.9
Severe (sheet)	47,100	5.7
Moderate	301,300	36.4
Slight	270,500	32.7
Little or none	152,800	18.3

Erosion and Fertility

Problems in erosion prevention and fertility maintenance occur in areas where the topography is steeply sloping and the surface texture is sandy loam.

Loss of soil can be controlled to a large extent by long rotations. Light textured soils are low in phosphorus and potassium which can be supplied by additions of commercial fertilizer. Organic matter additions are required to maintain soil fertility and help in the prevention of erosion. Slightly over 47,000 acres of the soils of Huron have low to very low fertility levels and are susceptible to erosion.

Drainage

Areas of good, imperfect, poor and very poor drainage are delineated in Fig. 13. Soil drainage depends on the rate of water percolation through the soil and the rate of surface runoff. If either or both of these are impeded, a wetter soil will result. Water percolation and surface runoff are closely related to texture, topography, and permeability of the soil horizons.

TABLE 22

DRAINAGE OF HURON COUNTY SOILS

Drainage Class	Acreage	% of Total
Good	406,700	47.9
Imperfect	212,200	24.6
Poor	148,900	18.1
Very poor	92,000	9.4

Fertility and Drainage

Slightly over eleven per cent of the soils of Huron County have problems associated with low fertility and inadequate drainage. The sandy soils are low to very low in phosphorus and potassium. Applications of barnyard manure are required to maintain the organic matter content particularly after drainage is improved. Areas where these problems are most common are shown in Fig. 14.

Much waste land is due to severe gully-erosion occurring along the Lake Huron shore.

Gully-Erosion and Drainage

As shown in Fig. 14, the gully erosion and drainage problem occurs only on the clay loam, poorly drained soils along the lakeshore. The gully erosion is caused by: (1) the clay loam texture which prevents the water from percolating through the soil rapidly, and (2) the fall from the land to the lake level which is 100 feet in slightly over a mile. The water, moving rapidly down to the lake, soon cuts a deep channel that widens with the passage of time.

Fertility

Fertility maintenance, although not a pressing problem on the areas shown in Fig. 14, is nevertheless necessary if the soils are to be kept in a pro-

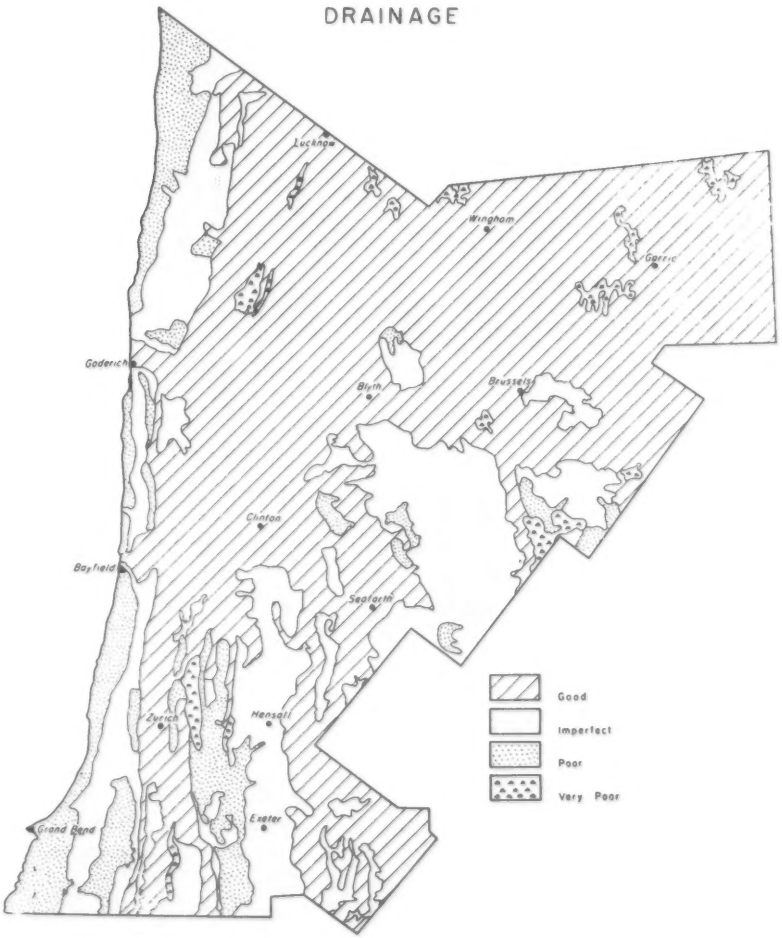


FIG. 13—Outline map of Huron County showing distribution of drainage classes.

ductive state. If good soil management practices are followed and adequate attention paid to fertility maintenance, these soils can be used without comparing their capabilities.

TABLE 23

ACREAGES OF PROBLEM AREAS IN HURON COUNTY

Problems	Acreage	% of Total
Erosion	301,300	36.3
Erosion and Fertility	47,100	5.6
Drainage	212,300	25.7
Fertility and Drainage	94,600	11.4
Gully-Erosion and Drainage	57,200	6.9
Fertility	116,400	14.1

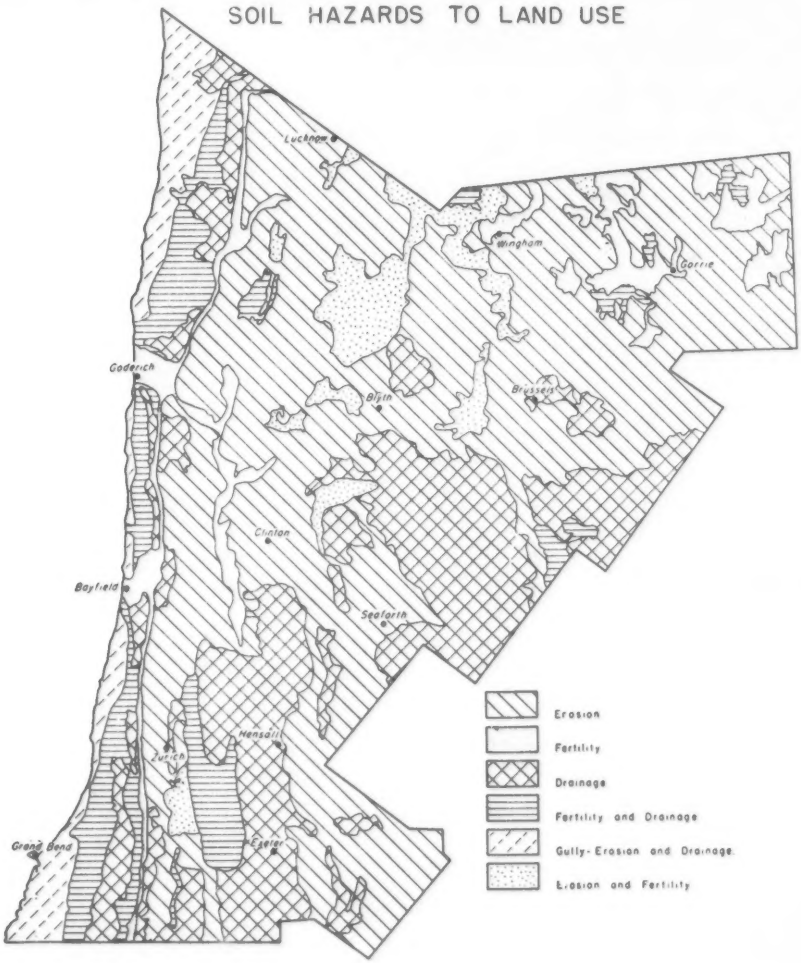


FIG. 14—Outline map of Huron County showing distribution of soil hazards to land use.

PART V

DISCUSSION OF ANALYTICAL DATA

The results of the physical and chemical analyses are presented in Tables 24 and 25. The samples are of surface soil taken from permanent pasture fields, wherever possible, to reduce variations due to management practices to a minimum.

Mechanical Analysis

The Bouyoucos Hydrometer Method was used to determine the mechanical composition of the Huron County soils. The amount of each size group of particles (soil separate) is reported on a percentage basis.

Soil Classes and Percentage of Various Soil Separates in Each Class*

I. Soils containing less than 20 per cent clay and 50–80 per cent sand.
   (a) Sandy loam — soil with over 25 per cent fine gravel, coarse and medium sand.

II. Soils containing less than 20 per cent clay, less than 50 per cent silt, and less than 50 per cent sand.
   (a) Loam — soil with less than 20 per cent clay and less than 50 per cent silt.

III. Soils containing over 50 per cent silt and less than 20 per cent clay.
   (a) Silt loam — soils with over 50 per cent silt and less than 20 per cent clay.

IV. Soils containing more than 20 per cent clay.
   (a) Clay loam — soils with 20–30 per cent clay and less than 50 per cent silt.

* Soil classes which are used throughout this report.

Reaction

The Huron County soils range in reaction from pH 5.1 to 7.9. However, the majority of soils have a pH of 6.5 to 7.5. The reaction of most of the soils of the County is about neutral.

Phosphorus

The Lohse and Ruhnke method of determining readily soluble phosphorus was employed for Huron County soils. The total phosphorus in the soils was not determined. The above authors state that soils containing 60 pounds or less of readily soluble phosphorus per acre will have a marked phosphate deficiency. In general, the light textured soils show a deficiency of phosphorus, while the medium and heavy textured soils have a somewhat better supply. Although no figure has been suggested to indicate what may be a sufficient amount of phosphorus for general farm crops, 200 pounds per acre might be accepted as a tentative figure for soils of neutral reaction. It is generally indicated in Table 24 that a large proportion (about 90 per cent) of the soils of Huron County are low in readily soluble phosphorus.

Potassium

Approximately 167 pounds of replaceable potassium per acre is considered necessary for the production of general farm crops. It will be noted from Table 24 that the soils of Huron County are fairly well supplied with replaceable potassium. Potassium fertilization is necessary on the light textured soils, which are low in this element, and on specialized crops such as fruits and vegetables that have high potassium requirements.

Calcium and Magnesium

The elements calcium and magnesium are both derived chiefly from the carbonate forms in which they occur in limestone bedrock. Conditions which affect the breakdown of the limestone affect the availability of these two elements. The exchangeable forms of calcium and magnesium represent the major proportion of the available supply and, according to Truog, in fertile loam soils that are not more than slightly acid, this commonly amounts to 3000 to 5000 pounds per acre plow layer of calcium and about one-fourth to one-third as much magnesium. On this basis, most of the soils of Huron County are well supplied with calcium and magnesium.

Organic Matter

The organic matter content as reported in Table 24 indicates the levels that occur in permanent pastures. It is reasonable to expect that organic matter levels in permanent pastures will be higher than those found in areas where short rotations are followed, and particularly where there is a high concentration of cash crops such as corn, peas and beans.

The organic matter content is highest in the poorly drained heavy textured soils and lowest in the well drained, light textured soils. In general, the organic matter content of the Huron County soils is fairly satisfactory. However, the need for adequate organic matter maintenance cannot be over-emphasized especially in areas where improved drainage and continuous cropping have been practised.

Base Exchange Capacity and Per Cent Saturation

The base exchange capacity and per cent saturation of surface samples from Huron County are presented in Table 25.

Base Exchange Capacity

Clay particles less than .002 mm. in size are colloidal as is a large part of the organic matter. All particles of collodial size, either organic or inorganic, have the ability to hold basic (positively charged) ions (e.g. Ca^{++}, Mg^{++}, K^{+}, $Na,^{+}$ H^{+}) on their surfaces. A positively charged ion held on a colloid may be replaced or exchanged by another positively charged ion from the soil solution. Such a reaction is called "Base Exchange". The number of basic ions (cations) which a colloid can hold is expressed in milliequivalents. The number of milliequivalents of cations which 100 gms. of soil will adsorb is known as Base Exchange Capacity. Hence, the Base Exchange Capacity of a soil is the number of milliequivalents of cations which the colloidal fraction of 100 gms. of soil can adsorb. The base exchange capacity increases as the amount of material of colloidal size increases.

Per Cent Saturation

The per cent saturation with a cation (e.g. $H,+$ $Ca++$, $Mg++$, $K+$) is a useful means of expressing the milliequivalents of any one cation which are adsorbed by the colloid in relation to the total number which could be adsorbed (i.e. Base Exchange Capacity). For example, in Table 25 the per cent saturation with calcium indicates the proportion of the exchange capacity which is occupied by calcium.

The base exchange capacity of the Huron County soils varies as much or more within series as it does between series. This condition is probably due to the predominating influence of variations in organic matter content. However, in general, the heavy textured soils have a higher base exchange capacity than the light textured soils.

According to various investigators the ratio of cations to one another, i.e. Ca/K and Ca/Mg, may be of greater importance in soil plant relations than the actual total amount of the cation present. The ratios of cations to one another is presented in Table 25 although there is insufficient information to show the part these ratios play in soil-plant relationships.

The per cent saturation with calcium is more than 100 in many instances because these soils contained free carbonate that was not removed prior to determining the exchangeable bases. Hence, some calcium which was not a part of the exchange complex was determined as being exchangeable.

According to the information available, a relatively wide Ca/K ratio is desirable. The Ca/Mg ratios are narrow, in most cases, since the limestone from which the soils developed contains fair proportions of magnesium.

The results tabulated in Tables 24 and 25 are included in the Soil Survey Report to be used as a guide in developing a fertility concept for the area and should be interpreted in consideration of the crop grown.

TABLE 24

CHEMICAL AND PHYSICAL COMPOSITION OF SURFACE SOIL FROM HURON COUNTY, ONTARIO (1)

Soil Type	Sample No	Location			Sand	Silt	Clay	Reaction pH Glass Electrode	Phosphorus Readily Soluble (2) Lbs. P/acre	Potassium Replaceable (3) Lbs. K/acre	Calcium Replaceable (4) Lbs. Ca/acre	Magnesium Replaceable (5) Lbs. Mg/acre	Organic Matter (6) %Cx 1.724
					Bouyoucos Hydrometer								
		Township	Lot	Conc.	per cent 1–.05mm	per cent .05-.002mm	per cent /.002mm						
Berrien sandy loam	91	Goderich	30	III	78.0	11.2	10.8	6.3	11	70	4,600	530	5.31
	125	Ashfield	4	IV	71.2	21.2	7.6	6.4	16	118	5,320	544	6.31
	124	Ashfield	IE	VI	59.2	26.0	14.8	6.6	46	128	4,580	862	4.26
	152	Hay	13	LF	50.6	25.8	23.6	7.3	60	154	7,820	1,270	4.97
	127	Ashfield	7	III	58.0	25.2	16.8	7.5	96	110	8,730	1,736	4.39
Berrien sand	76	Stephen	35	VIII	82.8	10.4	6.8	6.5	16	116	4,550	355	3.87
	30	Hay	11	XIV	82.0	11.6	6.4	5.1	8	160	1,800	210	5.62
	20	Stephen	34	XVIII	81.2	13.6	5.2	6.3	14	102	3,300	254	3.36
	148	Stephen	5	XV	80.4	14.0	5.6	6.4	32	70	3,780	272	3.02
	147	Stephen	5	XIV	74.4	17.6	8.0	6.1	18	50	4,660	744	4.78
Bookton sandy loam	150	Hay	9	VIII	75.2	14.4	10.4	6.2	32	128	2,970	833	3 53
	11-H	Hay	14	IX	65.0	21.2	14.8	6.0	6	156	2,400	753	3.62
	13-H	Hay	2	VIII	71.6	18.4	10.0	6.5	18	179	4,120	1,263	4.09
	14-H	Hay	6	X	73.2	14.3	12.5	6.6	17	265	4,320	1,312	4.16
Brady sandy loam	12-H	Hay	1	VI	56.2	28.6	15.2	7.3	40	74	5,240	1,016	5.80
	15-H	Goderich	17	II	53.1	27.8	19.1	7.5	31	82	11,360	680	7.28
Brookston clay loam	140	Stephen	19	A	30.8	37.8	31.4	7.6	252	290	17,920	2,126	4.44
	123	Ashfield	5W	VI	40.8	32.4	26.8	7.1	122	244	8,900	1,403	6.98
	117	Grey	32	XIII	33.8	39.8	26.4	7.5	280	92	17,460	1,968	14.90
	143	Stephen	15	IV	38.8	36.4	24.8	6 6	240	144	11,760	1,463	.....
	151	Stephen	22	XV	42.4	28.2	29.4	7.0	62	210	6,720	1,375	4.73
	A192	Stephen	22	N.B.	.....	.....	.....	.....	134	170	7,630	1,508	.....
	A193	Stephen	22	N.B.	.....	.....	.....	.....	46	150	6,320	1,019	.....
	122	Ashfield	10W	X	22.4	50.4	27.2	6 8	89	204	9,780	1,638	7.64
	119	Ashfield	20	LF	32.4	39.4	28.2	7.0	104	122	8,000	1,455	6.25
Brookston silty clay loam	120	Ashfield	15	XIII	21.2	52.8	26.0	7.4	100	120	8,320	1,369	4.33

Burford series	88	Goderich	30	XII	62.4	26.4	11.2	7.0	28	200	6,650	593	5.85
	156	Goderich	11	B.R.N.	63.6	27.6	8.8	7.3	40	66	8,330	1,544	3.14
	104	Colborne	3	III W	74.4	20.0	5.6	6.5	20	104	4,280	632	3.24
	95	Goderich	21	XIV	45.4	37.6	17.0	7.8	40	66	8,330	722	3.14
Dumfries loam	189	W. Wawanosh	27	IV	40.8	46.8	12.4	7.6	94	160	5,880	672	3.24
	4-H	E. Wawanosh	36	VIII	44.4	45.2	10.4	7.0	34	200	6,768	2,196	3.06
Granby sandy loam	31	Hay	15	VIII	77.6	15.6	6.8	7.7	660	48	26,550	440	7.62
	22	Hay	7	V	76.0	17.6	6.4	7.1	64	92	15,050	725	10.30
	21	Hay	6	IV	.....	.....	.....	.....	8	76	5,300	815	8.07
	1-H	Hay	....	....	71.0	21.2	8.8	7.3	325	137	17,760	2,267	7.53
Harriston loam	96	Hullett	17	III	41.0	42.2	16.8	7.4	66	148	7,300	1,283	5.17
	78	Hullett	26	VII	45.6	36.8	17.6	7.5	66	248	6,780	840	3.96
	164	Hullett	30	X	28.8	49.6	21.6	7.1	42	196	4,850	672	4.49
	129	Morris	5	X	29.6	48.4	22.0	7.4	74	138	5,600	936	4.01
	94	Colborne	11	II	43.0	38.6	18.4	7.8	138	164	15,150	1,963	3.09
	80	W. Wawanosh	19	VIII	34.8	44.6	20.6	7.6	154	296	10,800	2,197	5.41
	93	Goderich	20	XVII	28.8	44.4	26.8	7 6	94	210	8,400	1,653	5.07
Harriston silt loam	188	W. Wawanosh	27	II	27.6	53.8	18.6	7.1	36	150	5,520	1,163	4.69
	128	W. Wawanosh	21	III	28.2	52.8	19.0	7.2	41	176	6,170	1,237	3.72
	178	Hullett	4	V	29.2	50.0	20.8	6.7	66	256	6,840	989	5.88
	2-H	Morris	10	V	31.6	52.8	15.6	6.5	24	206	4,600	1,060	4.32
	7-H	Turnberry	21	X	33.2	52.6	14.2	7.1	24	121	4,760	2,954	5.43
Huron clay loam	146	Stephen	5	XI	34.0	31.2	34.8	6.3	60	196	3,960	1,003	3.67
	75	Stephen	2	VIII	43.2	36.4	20.4	6.7	34	210	2,200	816	4.21
	28	Stephen	6	VI	38.8	35.2	26.0	6.4	48	208	5,400	1,055	3.67
	139	Usborne	9	IV	28.0	49.4	23.6	7.4	114	210	12,300	1,562	4.76
	137	Usborne	2	IX	22.6	50.0	27.4	7.4	80	216	9,890	1,738	5.44
	27	Usborne	15	XI	21.4	51.4	27.2	7.4	82	226	8,000	860	4.16
	141	Usborne	29	III	22.8	44.8	32.4	7.4	130	198	13,580	2,109	4.95
	29	Usborne	31	VI	30.0	50.0	20.0	6.6	44	202	11,100	1,096	8.84
	155	Stanley	6	X	32.8	40.0	27.2	6.4	34	192	6,720	1,119	5.72
	84	Tuckersmith	9	VII	26.8	51.6	21.6	7.7	80	142	19,760	2.204	4.40
	89	Goderich	31	X	40.4	35.8	23.8	6.5	36	440	5430	732	4.73
	90	Goderich	66	VIII	38.0	34.4	27.6	7.1	56	326	4680	649	3.96
	162	Colborne	1E	IX	35.6	38.0	26.4	6.5	41	140	7,080	984	7.00
	140	Usborne	34	III	25.2	48.0	26.8	7.0	64	242	9,800	1,234	7.23
	86	Tuckersmith	7	VI	26.0	48.2	25.8	7.5	130	216	7,740	853	4.30
	86a	Tuckersmith	7	VI	25.0	48.6	26.4	6.9	180	282	8,400	726	4.88

TABLE 24 (*Cont'd*)

CHEMICAL AND PHYSICAL COMPOSITION OF SURFACE SOIL FROM HURON COUNTY, ONTARIO (1)

Soil Type	Sample No.	Location			Sand	Silt	Clay	Reaction pH Glass Electrode	Phosphorus Readily Soluble (2) Lbs. P/acre	Potassium Replaceable (3) Lbs. K/acre	Calcium Replaceable (4) Lbs. Ca/acre	Magnesium Replaceable (5) Lbs. Mg/acre	Organic Matter (6) %CX 1.724
					Bouyoucos Hydrometer								
		Township	Lot	Conc.	per cent 1-.05mm	per cent .05-.002mm	per cent .002mm						
Listowel loam	190	Morris	5	VIII	28.8	53.6	17.6	6.5	46	142	7,960	1,016	7.60
	118	Grey	12	IX	39.6	42.4	18.0	7.3	50	104	5,580	613	4.52
	163	Hullett	36	XII	46.8	37.4	15.8	7.5	56	108	4,260	726	3.04
	79	Morris	1	VII	35.2	45.6	19.2	6.9	36	568	5,250	853	4.73
	9-H	Grey	21	XIII	39.4	44.0	16.6	6.8	8	203	11,120	1,530	4.60
Listowel silt loam	105	McKillop	34	XIV	21.0	55.8	23.2	7.7	90	220	9,900	842	5.02
	87	Tuckersmith	42	I	24.4	50.4	25.2	7.4	114	338	11,100	1,320	5.07
	121	Ashfield	15	XIII	22.4	62.8	14.8	7.6	99	130	13,680	1,837	6.25
Parkhill loam	5-H	Morris	5	VIII	32.8	48.0	19.2	7.1	194	132	13,320	3,076	5.34
Perth clay loam	24	Stephen	5	XVI	48.8	29.0	22.2	6.6	36	220	4,320	821	4.39
	32	Hay	21	II	27.6	51.6	20.8	6.6	50	270	9,100	815	6.60
	142	Hay	11	I	24.4	51.2	24.4	7.0	72	162	9,940	792	6.03
	154	Stanley	3	XIII	49.0	30.4	20.6	7.4	80	152	11,690	1,531	6.74
	161	Ashfield	3W	XI	34.2	36.6	29.2	7.7	232	124	16,570	1,427	6.57
	144	Stephen	15	VIII	38.0	35.2	26.8	6.8	39	136	4,880	462	4.11
	26	Usborne	10	I	37.4	32.6	30.0	.....	34	120	6,300	.....	.....
	85	Tuckersmith	13	VII	29.6	49.6	20.8	7.0	76	160	9,000	783	4.88
	166	Tuckersmith	2	VIIIE	30.0	49.8	22.4	7.3	74	276	12,390	1,493	3.53
	97	McKillop	26	XI	34.8	43.4	21.8	7.3	82	124	9,150	983	9.47
	103	McKillop	15	VII	23.6	45.8	20.6	6.8	92	190	11,900	1,031	8.85
	92	Goderich	10	VII	35.2	36.8	28.0	7.1	60	306	6,610	638	5.17
	138	Usborne	1	VII	25.8	51.0	23.2	6.1	24	190	4,800	432	4.61
	179	McKillop	4	V	28.4	51.6	20.0	6.2	216	154	10,700	1,196	9.47
Teeswater silt loam	16-H	Turnberry	3	X	33.8	51.0	16.3	6.7	26	177	7,520	1,579	4.62
	17-H	Howick	13	XVI	24.8	56.2	19.0	6.2	30	175	4,560	1,706	5.01
	18-H	Turnberry	20	IX	26.2	55.6	18.2	7.1	23	236	5,120	2,162	4.06
	6-H	Turnberry	6	B	34.8	51.0	14.2	7.4	37	234	6,652	3,022	4.88

Toledo clay loam	153	Stanley	19	LF	35.6	39.2	25.2	7.5	90	150	10,980	864	4.47
Donnybrook sandy loam	191	Morris	8	VI	50.0	37.6	12.4	6.4	26	96	3,760	731	4.49
	3-H	E. Wawanosh	36	XII	57.4	29.6	13.0	7.1	27	131	4,560	923	3.31

(1) Samples were taken during the course of the Huron County Soil Survey, 1936. Analyses were done in 1948. Old pastures representative of the type were selected whenever possible. The analyses were done by Messrs. H. S. Ive, E. F. Bolton and D. W. Hoffman.

(2) Lohse and Ruhnke's method of determining readily soluble phosphorus was employed. For discussion of this method see Lohse, H. W., Ruhnke, G. N., "Studies of Readily Soluble Phosphorus in Soils" — Soil Science 35:6, 1933.

(3) Replaceable potassium — Volk and Truog's method of determining replaceable potassium was employed. For discussion of this method see: Volk, N. J., and Truog, E., "A Rapid Method of Determining the Readily Available Potash of Soils" — Jour. Amer. Soc. of Agron. 26, 537–46, 1934.

(4) The replaceable calcium was determined on the same extract that was used in the determination of potassium.

(5) Magnesium is determined from the filtrate remaining from the calcium determination.

(6) The organic matter data was obtained by applying the factor 1.724 to the per cent organic carbon. The method described by Allison, L. E., "Organic Soil Carbon by Reduction of Chromic Acid" — Soil Science, Oct. 1935, p. 311, was used to determine the per cent organic carbon.

TABLE 25

BASE EXCHANGE CAPACITY AND PER CENT SATURATION OF SURFACE SAMPLES FROM HURON COUNTY, ONTARIO

Soil Type	Sample No.	Base[1] Exchange Capacity M.E./100 gms.	Per Cent Saturation				Ratios	
			$^{2}H+$	$Ca++$	$Mg++$	$K+$	Ca:K	Ca:Mg
Berrien sandy loam	91	13.83	1.1	82.3	15.2	0.6	127.5:1	5.4:1
	125	15.41	.....	86.1	14.2	0.9	81.8:1	5.6:1
	124	9.34	.....	121.9	35.0	1.6	76.1:1	3.5:1
	152	19.86	.....	98.6	26.2	0.9	99.6:1	3.7:1
	127	12.62	.....	172.5	56.1	1.1	155.6:1	3 0:1
Berrien sand	76	12.18	.....	93.0	11.5	1.2	76.2:1	8.0:1
	30	8.63	35.9	52.1	9.3	2.7	21.9:1	5.6:1
	20	9.32	.....	88.0	10.7	1.3	63.0:1	8.2:1
	148	9.53	.....	98.5	11.5	0.9	10.5:1	8.5:1
	147	13.49	2.2	75.8	21.5	0.5	149.3:1	3.5:1
Bookton sandy loam	150	11.02	0.8	67.1	30.8	1.3	45.3:1	2.1:1
	11-H	10.50	11.4	57.2	29.5	1.9	31.5:1	1.9:1
	13-H	13.11	.....	77.8	38.2	1.7	46.7:1	2.0:1
	14-H	13.42	.....	80.3	40.2	2.5	32.0:1	2 0:1
Brady sandy loam	12-H	12.70	.....	103.3	32.3	0.7	138.6:1	3.2:1
	15-H	21.40	.....	132.7	13.1	0.5	270.8:1	10.1:1
Brookston clay loam	149	28.36	.....	158.1	30.7	1.3	120.9:1	5.2:1
	123	19.72	.....	112.6	28.9	1.5	71.2:1	3.9:1
	117	49.86	.....	87.7	16.2	0.2	373.0:1	5.4:1
	143	27.08	.....	107.8	22.2	0.6	159.3:1	4.8:1
	151	18.27	.....	92.1	30.6	1.4	62.6:1	3.0:1
	122	21.69	.....	112.5	30.9	1.2	93.7:1	3.6:1
	119	19.35	.....	103.6	30.5	0.8	128.5:1	3 4:1
Brookston silty clay loam	120	15.92	.....	126.1	35.2	0.9	131.2:1	3.5:1
Burford series	88	14.09	.....	113.5	17.0	1.8	62.5:1	6.6:1
	156	10.13	.....	206.2	62.3	0.8	247.0:1	3.3:1
	104	5.68	.....	188.7	45.8	2.3	80.5:1	4.1:1
	95	14.93	.....	140.0	19.5	0.5	247.2:1	7.2:1
Dumfries loam	189	11.76	.....	124.4	21.2	1.6	71.7:1	5.4:1
	4-H	16.32	.....	103.0	55.2	1.5	65.6:1	1.8:1
Granby sandy loam	31	16.45	.....	403.0	10.9	0.3	1081.7:1	36.6:1
	22	23.37	.....	161.5	12.4	0.5	320.5:1	13.0:1
	1-H	24.84	.....	178.0	37.5	0.7	252.8:1	4.7:1
Harriston loam	96	14.68	.....	117.2	36.1	1.3	91.0:1	3.2:1
	78	14.10	.....	120.0	24.1	2.2	53.2:1	4.9:1
	164	13.46	.....	90.0	20.1	1.8	48.4:1	4.4:1
	129	12.38	.....	113.3	30.7	1.4	79.5:1	3.7:1
	94	10.95	.....	344.8	74.0	1.9	180.3:1	4.6:1
	80	15.23	.....	184.0	59.1	2.4	74.1:1	3.1:1
	93	16.81	.....	125.0	40.4	1.6	78.1:1	3.8:1
Harriston silt loam	188	11.94	.....	115.8	40.3	1.6	71.9:1	2.8:1
	128	10.98	.....	140.6	46.6	2.0	68.5:1	3.0:1
	178	15.87	.....	107.8	25.2	2.0	52.2:1	4.2:1
	2-H	14.00	.....	82.0	31.4	1.8	43.7:1	2.6:1
	7-H	14.36	.....	82.9	77.2	1.0	77.0:1	1.0:1
Huron clay loam	146	14.38	11.8	69.1	17.4	1.7	39.6:1	3.9:1
	75	10.03	9.4	55 0	33.0	2.6	21.2:1	1.6:1

TABLE 25 (*Cont'd*)

BASE EXCHANGE CAPACITY AND PER CENT SATURATION OF SURFACE SAMPLES FROM HURON COUNTY, ONTARIO

Soil Type	Sample No.	Base[1] Exchange Capacity M.E./100 gms.	Per Cent Saturation				Ratios	
			[2]H+	Ca++	Mg++	K+	Ca:K	Ca:Mg
	28	17.82	.....	75.8	24.2	1.5	51.2:1	3.1:1
	139	15.93	.....	193.2	40.2	1.7	114.6:1	4.8:1
	137	17.69	.....	139.8	40.1	1.5	89.1:1	3.4:1
	27	18.17	.....	110.4	19.3	1.5	69.2:1	5.7:1
	141	19.93	.....	170.0	43.8	1.2	133.9:1	3.8:1
	29	30.64	.....	88.1	14.6	0.7	104.6:1	6.0:1
	155	23.31	7.3	72.0	19.7	1.0	68.2:1	3.6:1
	84	17.28	.....	285.7	52.7	1.1	272.4:1	5.4:1
	89	16.91	.....	79.9	17.7	3.3	25.0:1	4.5:1
	90	11.64	.....	100.6	22.7	3.5	28.8:1	4.5:1
	162	24.08	9.5	73.2	16.6	0.7	99.4:1	4.4:1
	140	22.36	.....	109.7	22.4	1.3	79.6:1	4.9:1
	86	15.83	.....	121.8	22.1	1.7	69.8:1	5.5:1
	86a	17.33	.....	121.3	16.8	2.1	58.2:1	8.0:1
Listowel loam	190	21.62	.....	92.1	18.9	0.8	110.0:1	4.7:1
	118	12.51	.....	109.7	20.0	1.1	103.0:1	5.4:1
	163	8.16	.....	130.0	35.6	1.7	76.9:1	3.6:1
	79	16.50	.....	79.5	21.2	4.3	18.1:1	3.7:1
	19-H	16.83	.....	165.4	37.5	1.7	107.1:1	4.4:1
Listowel silt loam	105	18.55	.....	133.2	18.3	1.5	87.7:1	7.2:1
	87	19.96	.....	139.1	27.1	2.1	64.2:1	5.1:1
	121	27.39	.....	125.2	27.4	0.6	206.0:1	4.5:1
Parkhill loam	5-H	20.00	.....	165.0	63.0	0.8	193.0:1	2.6:1
Perth clay loam	24	15.23	5.9	70.7	21.6	1.8	38.3:1	3.2:1
	32	22.93	.....	99.0	14.4	1.5	65.6:1	6.8:1
	142	24.61	.....	100.6	13.0	0.8	120.0:1	7.7:1
	154	25.13	.....	116.0	25.1	0.8	141.6:1	4.6:1
	161	26.84	.....	154.0	21.7	0.5	261.3:1	7.1:1
	144	13.86	.....	95.0	13.7	1.2	70.1:1	6.4:1
	85	16.36	.....	137.8	19.6	1.2	111.0:1	7.0:1
	166	14.92	.....	207.2	40.9	2.3	87.7:1	5.0:1
	97	22.47	.....	101.6	17.8	0.7	143.8:1	5.7:1
	103	21.73	.....	137.3	18.9	1.1	122.6:1	7.2:1
	92	16.40	.....	100.7	15.8	2.3	42.2:1	6.3:1
	138	15.26	8.5	78.7	11.2	1.6	49.4:1	7.0:1
	179	33.06	3.6	80.9	14.9	0.6	135.6:1	5.3:1
Teeswater silt loam	16-H	21.41	.....	76.2	30.4	1.1	72.1:1	2.5:1
	17-H	23.20	19.9	49.1	30.1	0.9	51.0:1	1.6:1
	18-H	19.00	.....	67.5	46.8	1.6	42.3:1	1.4:1
	6-H	20.16	.....	82.6	61.6	1.4	55.2:1	1.3:1
Toledo clay loam	153	21.37	.....	128.0	16.4	0.9	143.3:1	7.3:1
Donnybrook sandy loam	191	13.11	4.6	71.8	22.8	0.8	77.7:1	3.1:1
	3-H	11.04	.....	103.2	33.5	1.5	71.9:1	3.0:1

1 — Method proposed by Schollenberger, C. J., and Simon, R. H., Soil Science 59:1, 1945, "Determination of Exchange Capacity and Exchangeable Bases in Soil, Ammonium Acetate Method." The alternate method was used on Huron County soils in which the soil is leached with 1 N KCl.

2 — By difference.

RP-1-90-1M
Queen's Printer for Ontario, 1990
ISBN 0-7729-6599-4